

DIESEL ENGINES • DUAL FUEL ENGINES • NATURAL GAS ENGINES • GAS TURBINES

DIESEL AND GAS ENGINE PROGRESS



FIVE DOLLARS PER YEAR

AUGUST 1960

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WHAT'S IN THE FUTURE FOR DIESEL TAXIS?

Latest developments show engine builders aim for new market by hitting old problems of size and weight

Surveys undertaken by foreign and domestic firms alike indicate that American owners of light- and mediumweight fleets, faced with continuously rising operating costs, have developed into a very promising market for compact, lightweight, high-speed diesel engines. Performance records of various types of these vehicles, experimentally equipped with diesel engines, show that taxi fleets are among the most susceptible to important operating economies through dieselization.

Typical taxi travel an average of 20,000 miles a year in thick city traffic. This type of operation not only sends fuel consumption soaring, but also has proved, according to recent research, to be the most detrimental in terms of engine wear.

Leading engine manufacturers say they're tailoring the diesel to taxi operating routine by producing engines that, pound for pound, turn out almost as much horsepower as gasoline engines.

Diesel taxi experience to date

There are already several hundred diesel taxis operating in the U.S., and performance records of these cars appear to bear up diesel engine builders' contention that some of the diesel's greatest economy advantages are obtained in stop-and-go-service.

Some of the advantages cited by diesel taxi owners include lower operating costs (about 50% less); longer periods between overhauls (up to 500,000 miles in some cases) and less costly overhauls when they're needed.

How it's being done

Different manufacturers offer different solutions to the requirements of taxi service. One manufacturer predicts that the biggest initial expense item on diesel engines, fuel injection systems and fuel pumps, will be eliminated by mass production. Other manufacturers say they have been able to cut down on the first-cost of engines by maximum interchangeability of parts. Detroit Diesel, for example, reports using only three bore



sizes for their whole range of diesels. Hercules claims to have brought initial cost down to about \$15 per horsepower by designing all crankshafts for diesel loads, by using common blocks for both gasoline and diesel engines, and by standardizing on only two ring sizes, two piston sizes, and identical con-rods and bearings in all engines.

Builders say they get more power out of lighter engines by supercharging and turbocharging, and by making large components, like flywheel housings, of aluminum and other lightweight metals. The newest Her-

cules diesels are said to weigh only about 5.5 pounds per horsepower.

To keep 'em rolling

Engine builders and petroleum manufacturers have been working hand-in-hand on the problem of optimum lubrication for these new engines. Texaco, for example, has compiled an outline of lubrication recommendations designed to keep an engine as clean as possible for as long as possible. For information write:

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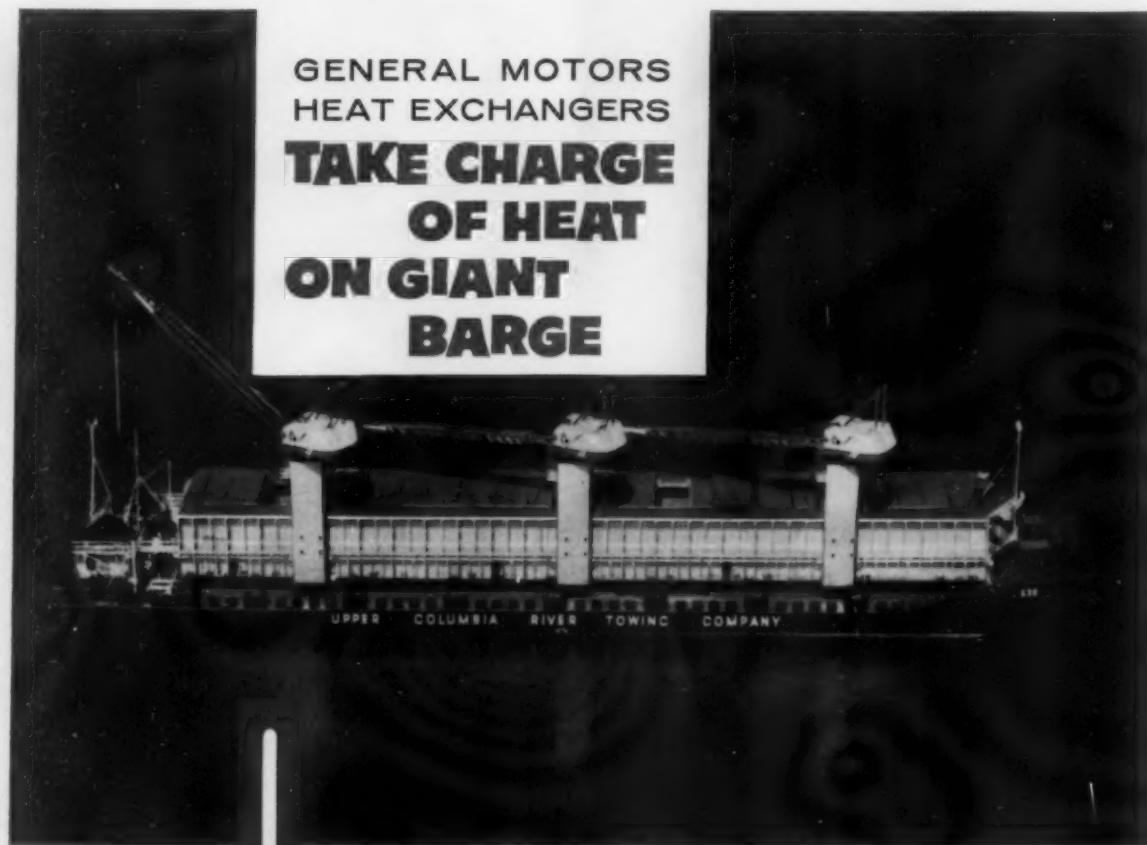
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CONTENTS FOR AUGUST, 1960

Diesel Repowers Coal Ship, <i>M/V Sensibar</i>	21
New I-H Engine for Light Truck Service	24
Oil Search at Yakataga Bay	26
Power Cars Aid Brazil	28
Pneumatic Automatic Control for Engines	30
Small Truck Diesel Profits Bakery	32
Self Opening Feature on New Separators	34
Governor Has External Droop Control	34
New 2500 HP Mainline GE Diesel Locomotive	36
Gas Turbine for Ore Hauling	39
Towboats Slated for Coal, Petroleum Trade	40
Diesels Keep Foods Cool to Alaska	42
V-12 Diesels in Fast, New Crewboat	43
General Electric's New 900 HP Gas Turbine	44
New Exhaust Pyrometer for Diesel Trucks	46
Highway Reefers Continue to Dieselize	47
Diesel Service Progress	50
Miami's Tugboat Race	51
What's Going On In England	52

EXECUTIVE OFFICES

9110 Sunset Blvd.
Los Angeles 46, Calif.

EDITORIAL OFFICES

1701 W. Wisconsin Ave.
Milwaukee 3, Wisc.

BUSINESS OFFICES

MILWAUKEE 3:
Bruce W. Wadman
1701 W. Wisconsin Ave.
Division 4-5355

LONDON E.C. 4:
G. L. Featherstonhaugh
St. Paul's Corner
Ludgate Hill
City E3 1B

FIELD EDITORS

MIAMI, FLA.:
Edwin Dennis
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TUxedo 8-2188

LOS ANGELES 46:
James Joseph
8421 Melrose Ave.
OLive 3-4542

WALNUT CREEK, CALIF.:
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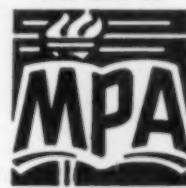


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FRONT COVER ILLUSTRATION

One of GE's new U25B diesel locomotives, powered by a Cooper-Bessemer 2500 hp engine, in an early run. See page 16 for a description of this new mainline locomotive.

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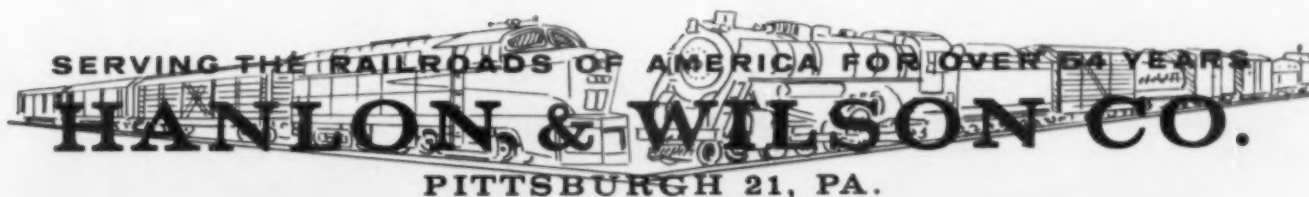


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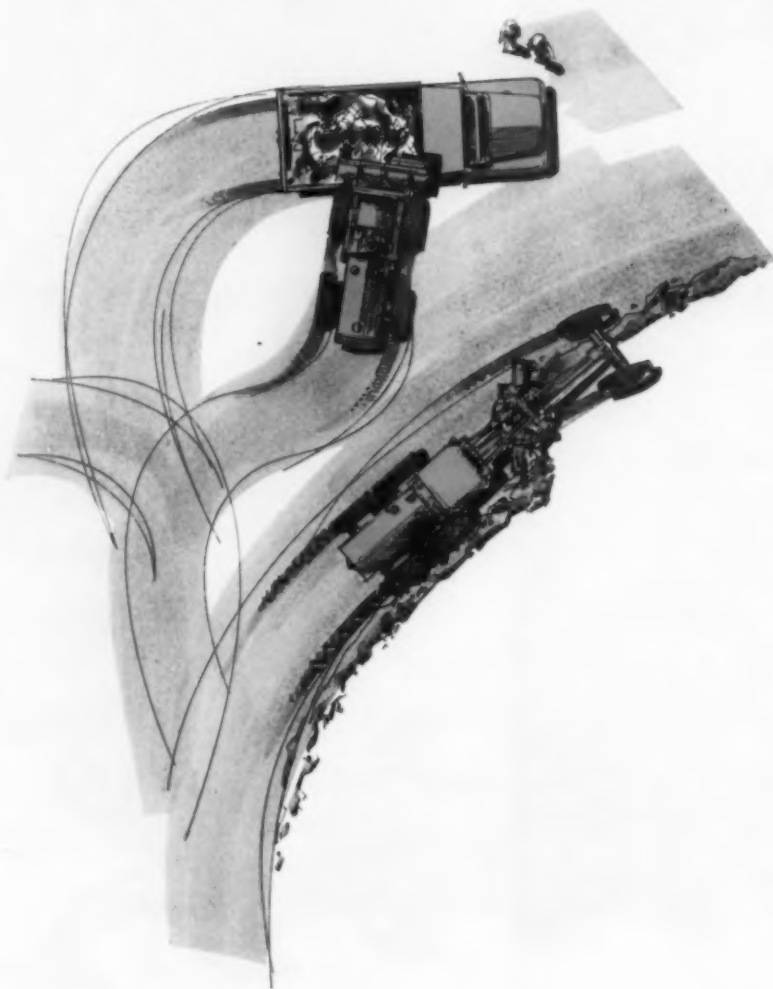


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For more information on the efficiency and low-operating cost of Cummins C&J Diesels, see your nearest construction equipment representative or Cummins Distributor.



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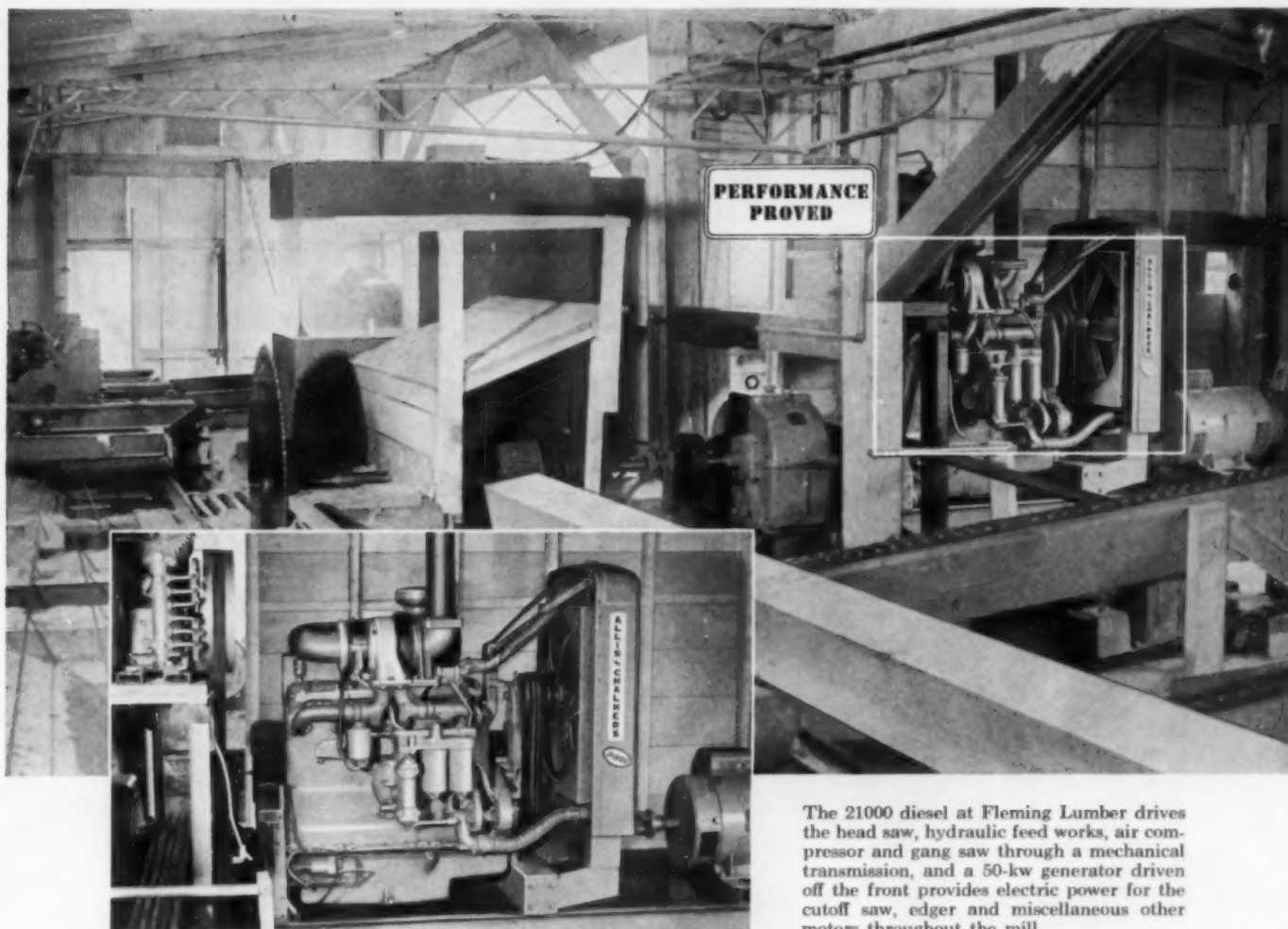
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"Adequate power... with amazingly rapid recovery"

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"Low fuel consumption... maintenance nil"

"We are using less than six gallons of fuel per hour at 8200-ft elevation. Maintenance has been nil — just normal lube oil, fuel and air cleaner service."

"Excellent starting, even at 0 to 10 degrees"

"Winter temperatures here drop to 20° below zero fairly often, which means morning starting in the 0 to 10° range. Starting is excellent, particularly since it is necessary to turn the double reduction gear box, air compressor, generator and several accessory shafts in starting."

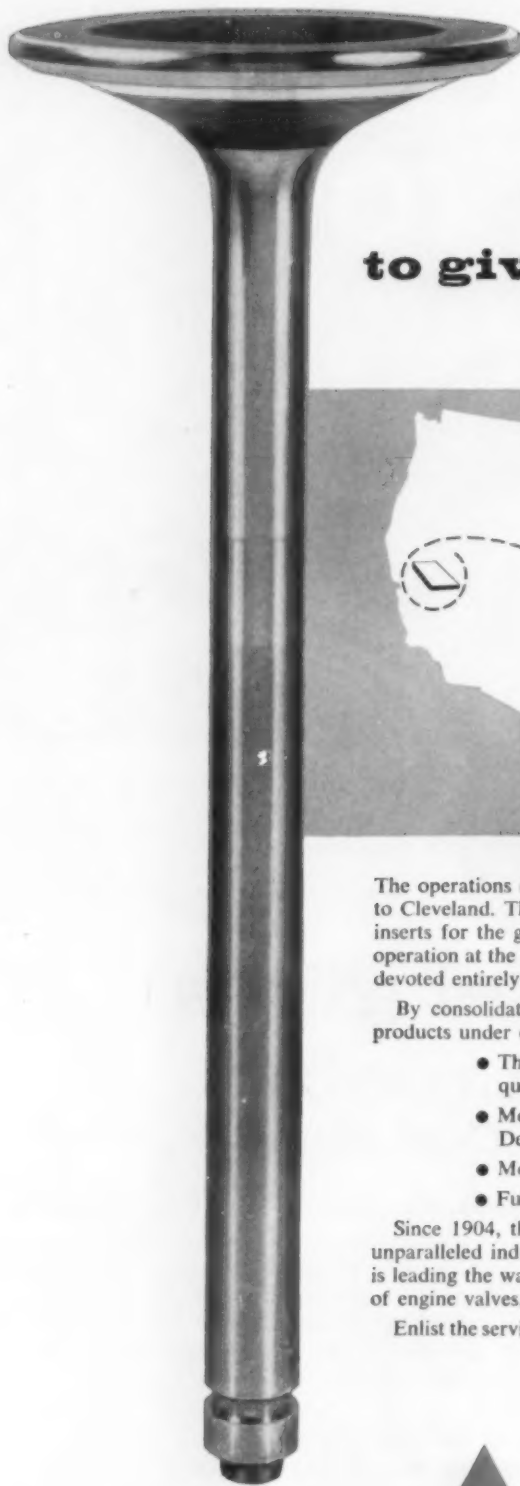
"... needless to say, we are completely satisfied,"

concludes Mr. McAllister. "Our Allis-Chalmers 21000 operates our complete mill with ease." If you want "performance proved" diesel advantages like these, see your Allis-Chalmers dealer for details. Allis-Chalmers, Milwaukee 1, Wis.

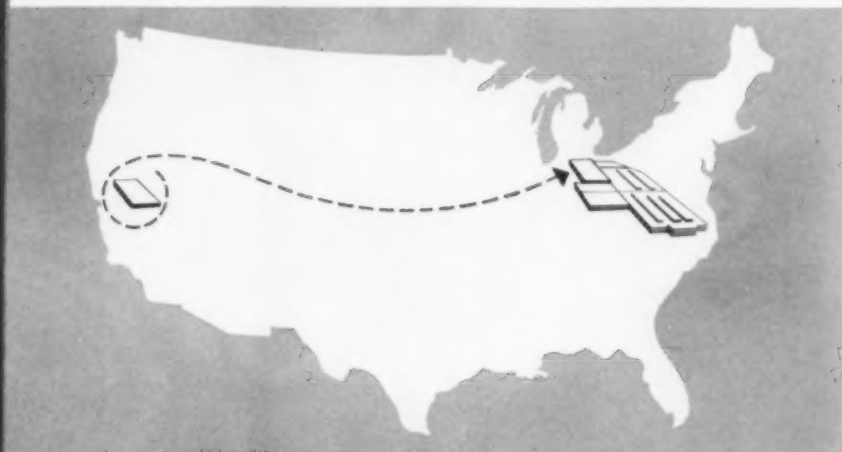
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"We have no wear problems at all using RPM DELO Supercharged #3," says Master Mechanic Ben Jacklin. "Never had any lubrication trouble in any engine using it. The oil's done an outstanding job in our equipment."

RPM DELO Oils reduce wear and prolong engine life because they cling to parts whether the engine is running or idle. Anti-oxidant fights gum and lacquer formation, special detergent keeps parts clean. Other additives prevent corrosion, crankcase foaming.

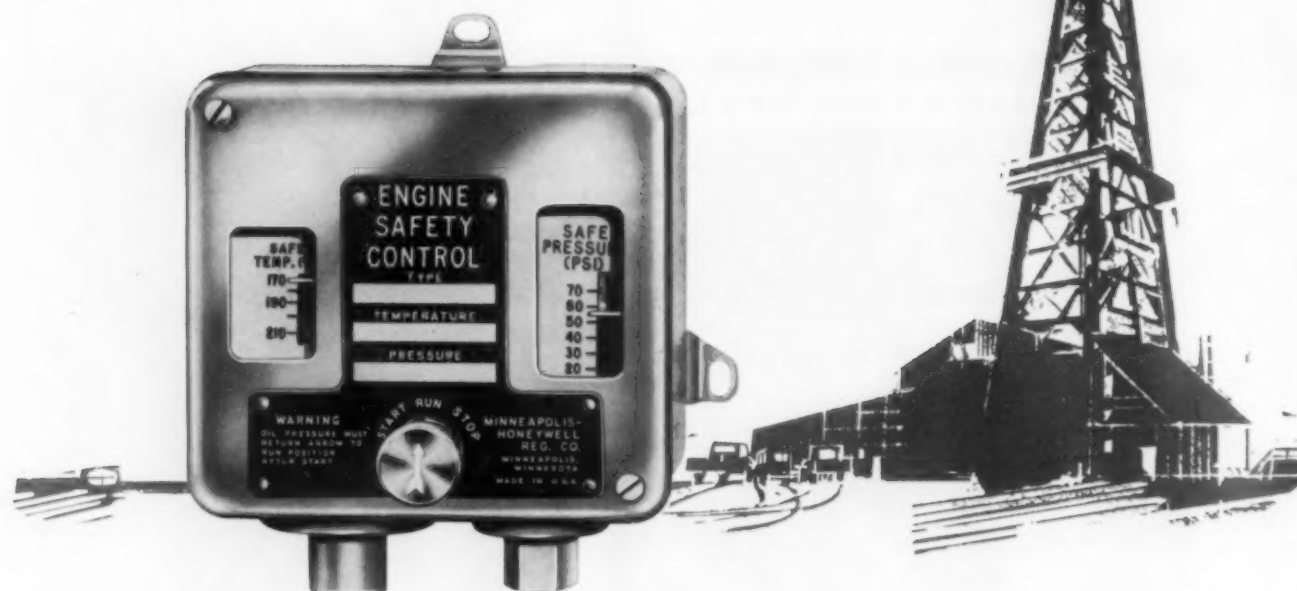
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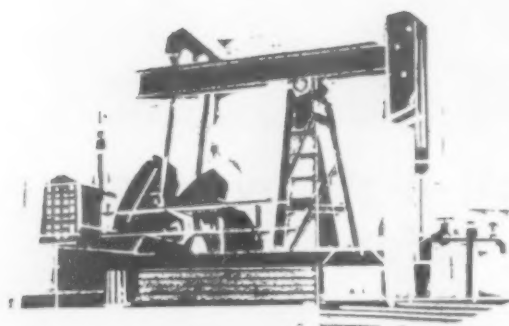
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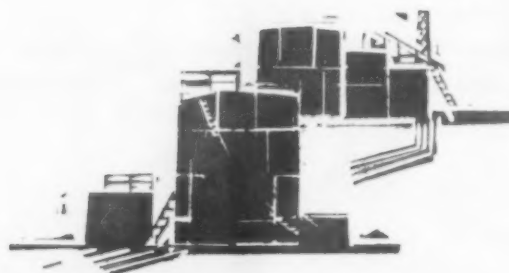
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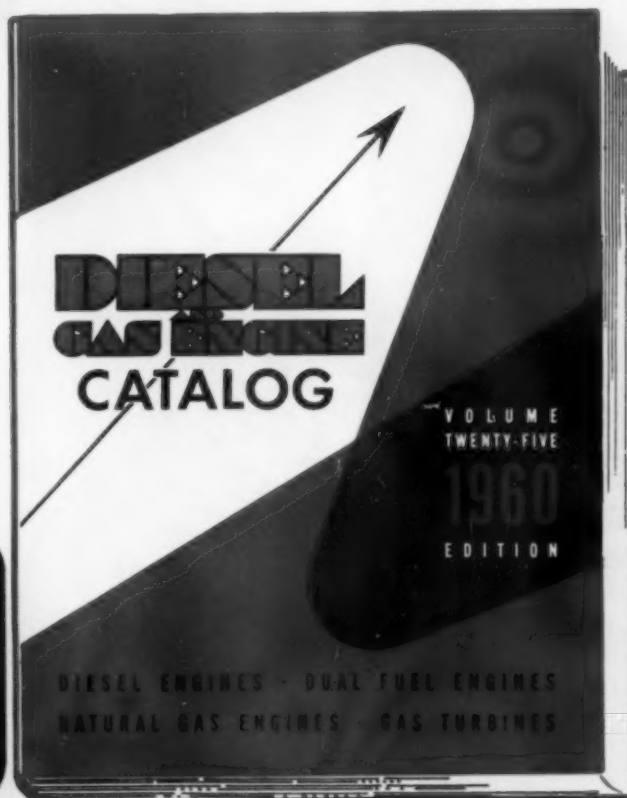
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4. **ACCESSORY EQUIPMENT** — Recent developments in fuel injection systems, governors, and other key accessory units are detailed and illustrated fully in this section.
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Low cost per mile**
- ★ **Amazing increase
in piston life**
- ★ **Maintains
new engine power
and performance**

Here's an entirely new piston design that combines all the advantages of aluminum alloy pistons with the long life of steel in the top ring groove. No noticeable increase in weight. G and E Wire Insert Pistons are real top performers at **LOW COST**—barely more than ordinary alloy pistons!

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You get longer piston wear at lower cost because G & E Wire Insert Pistons have a pre-shaped steel wire cast right in the piston wall where the top ring is located. When the grooves are machined, this tough wire is cut, exposing the closely spaced hard surfaced bearing points on top and bottom faces of the groove.

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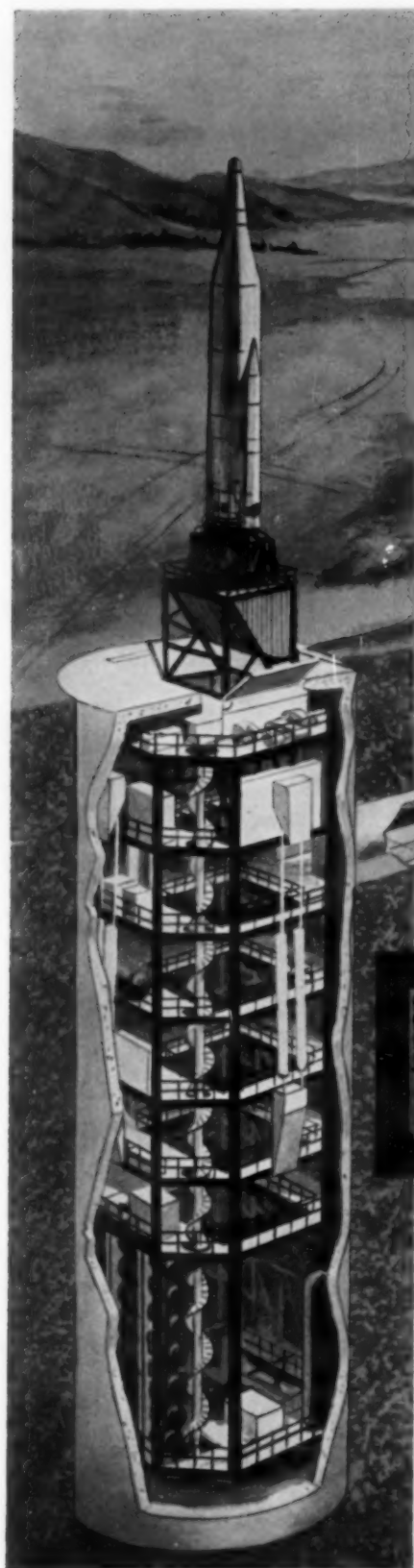
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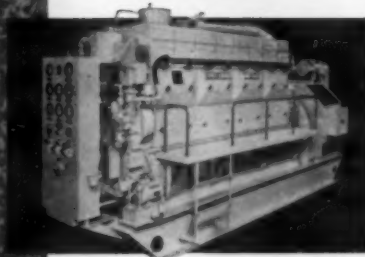
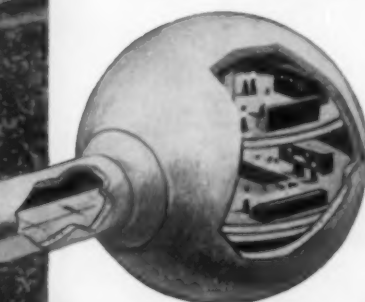


ESTABLISHED 1868



WHITE SUPERIOR ENGINES selected for ATLAS launching sites!

At USAF Atlas launching sites throughout the United States, prime and standby power will be supplied by White Superior engines! The Army Corps of Engineers, Kansas City, Missouri, has purchased 149 eight-cylinder supercharged Model 40 Superiors, each driving a 500 KW generator. These engine-generator sets will produce precise frequency for operation of computers and other electronic equipment. Six of the 13 planned Atlas ICBM squadrons will feature underground silo-type launching sites. Here an additional task for the Superiors will be powering elevator machinery to lift the 120-ton ICBM's to ground level, after they have been fueled and checked out down under.



**White
Diesel**

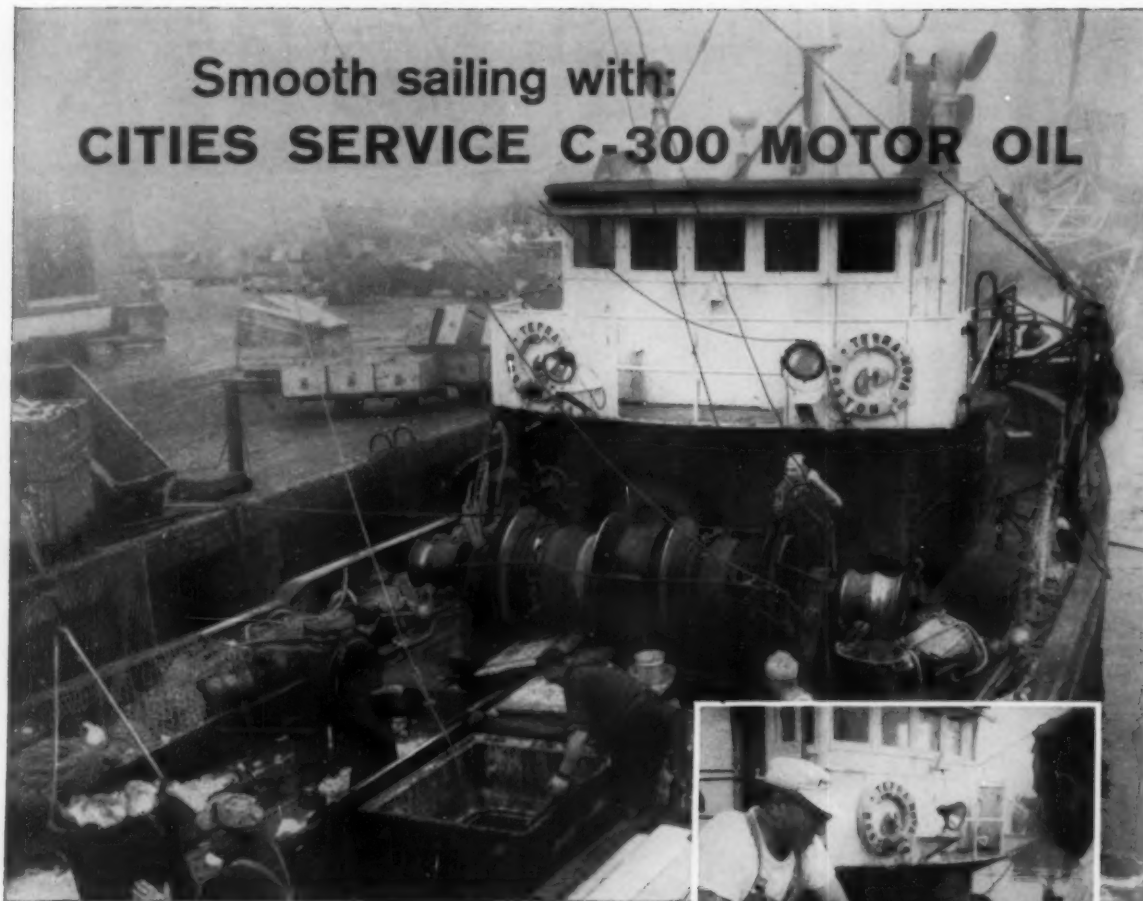


WHITE DIESEL ENGINE DIVISION
THE WHITE MOTOR COMPANY
Plant and General Offices: Springfield, Ohio

The contract for 149 Superiors highlights a growing and impressive list of Superior-powered U.S. defense installations. Included are the "Texas Towers," portions of "DEW" line and "SAGE" project, Eglin Gulf Test Range and other missile tracking ranges, and numerous launching sites for other types of missiles. Acceptance of Superior engines for these assignments is convincing evidence of their rugged dependability, trouble-free performance and economical fuel consumption. Superior engines—215 to 2150 HP or 150 to 1500 KW—will also meet your exact power requirements, including automatic, unattended or remote controlled operation. Write for complete information today!

USAF artist's conception of Atlas underground silo for launching missiles

Smooth sailing with:
CITIES SERVICE C-300 MOTOR OIL



**Net result:
3,000,000 pounds
of fish a year**



The Terra Nova is a steel, diesel fishing trawler owned by the Westerbeke Fishing Gear Co. The 110 foot vessel operates out of the Boston Fish Pier, the largest such pier in the world. The 30 trips that the Terra Nova makes each year last about ten days each. Although quite capable of ranging the entire North Atlantic, most trips are made along Georges Banks, 250 miles out to sea. The average catch for each trip is 100,000 pounds of deep sea fish,

which adds up to 3,000,000 pounds a year.

Four years ago the Terra Nova started using Cities Service C-300 Motor Oil and her Chief Engineer, Herbert Messenger says, "These engines get quite a workout. They run continuously from start to finish of every trip. Thanks to C-300 they haven't needed an overhaul in two years. This oil really keeps an engine clean. Rings don't stick and filters last 40 percent longer. We used to clean exhaust ports after every trip. With C-300 they go four trips before cleaning is necessary."

To find out how C-300 Motor Oil can improve the operation of your diesels, call your local Cities Service Lubrication Engineer. Or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

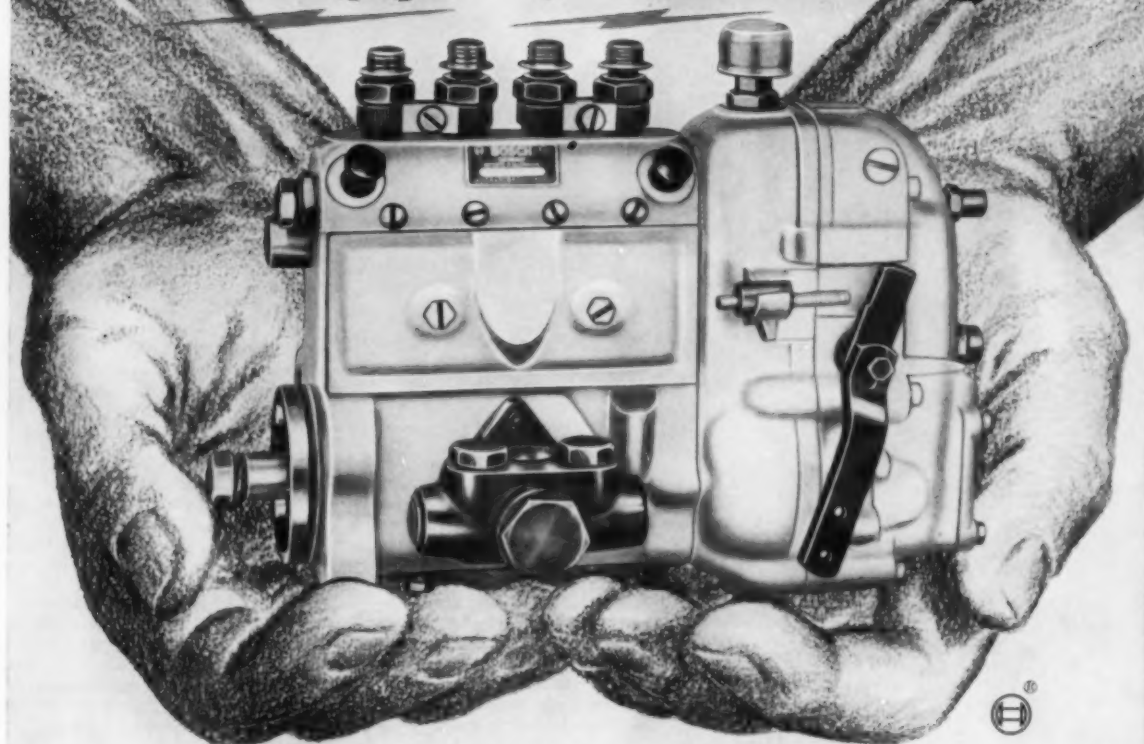


GETTING THE FACTS
—Chief Engineer Herbert Messenger discusses lubrication of the Terra Nova's 550 horsepower engines with William D'entremont, Cities Service Lubrication Engineer.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

ROBERT BOSCH PUTS THE **POW**^{IN}**POWER**



— in the world's finest Fuel Injection Equipment

ROBERT BOSCH means fuel injection equipment made to the closest tolerances. It means over 30 years of experience by the designers of the fuel injection equipment which made the high speed diesel engine practicable. It means fuel injection equipment of consistently higher quality at lower price...most complete line of nozzles...world-wide service. Leading engine makers here and abroad use ROBERT BOSCH as original equipment.

ROBERT BOSCH CORPORATION

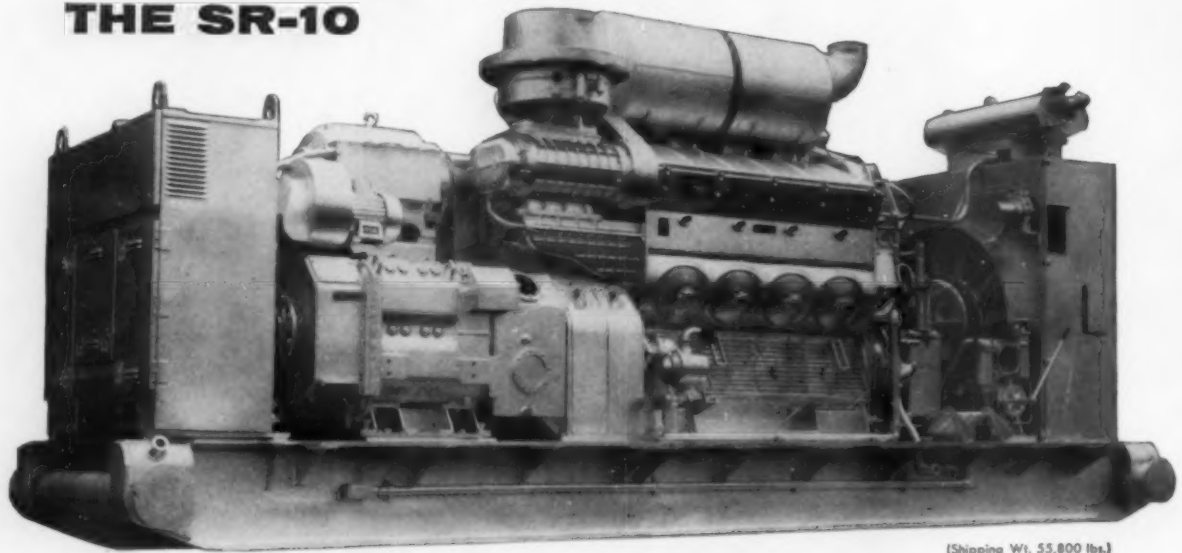
40-25 Crescent St., Long Island City 1, N.Y. • 225 Seventh Street, San Francisco 3, Calif.

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ELECTRO-MOTIVE

—for deep drilling
THE SR-10



[Shipping Wt. 55,800 lbs.]

The standard of Diesel-electric power

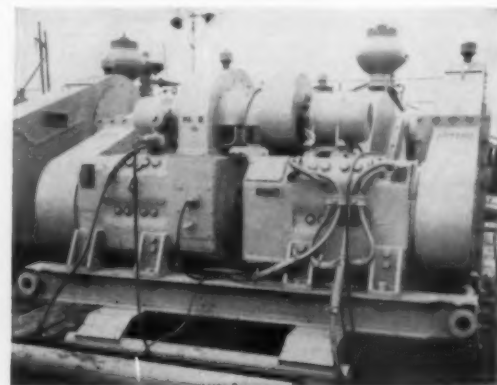
Electro-Motive power has been picked for more deep well applications than any other Diesel-electric system. Its record of dependability, low maintenance and economy, recorded under every conceivable operating condition, have made it the outstanding choice for both land and offshore applications. Most important, it is the *only* deep well Diesel-electric system manufactured and backed by one company.

The SR-10 is the newest Electro-Motive deep well power unit. It is the first standardized, completely self-sufficient power system. An integral AC generator eliminates need of outside AC power for blowers, excitation and control equipment. The 1000 hp 8-cylinder Diesel engine drives two generators that produce 640-KW each. Models are available for Dual-fuel operation.



Sensitive, accurate control

Controls for the SR-10 combine the "feel of steam" with the instantaneous response and accuracy of electric drive. Compact, centralized panel gives the driller supervision of all Diesel-electric equipment including safety shutdown.

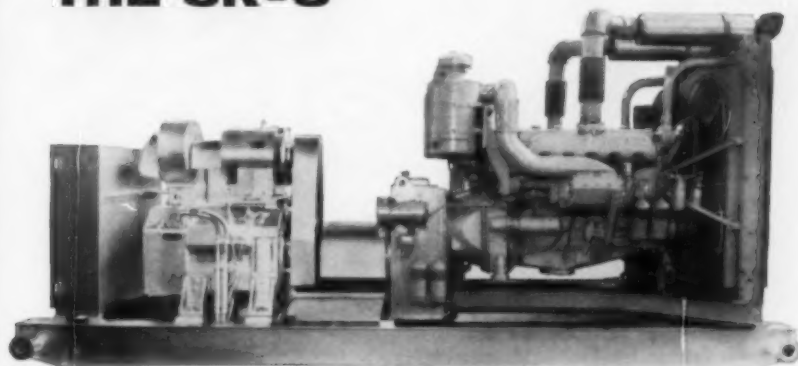


Flexible, positive power

Drive motors for the SR-10 deliver up to 800 hp. The D-49 motor provides smooth and rapid acceleration of loads with positive control of speed and torque. Both drive motors and generators are identical except for field windings, a factor that reduces service costs.

POWER

—for medium depth drilling **THE SR-5**



Simple, economical, adaptable

The SR-5 was specifically designed to meet the needs of medium depth drilling. It combines extreme simplicity of design in a compact, portable assembly that saves hours and dollars on rig-up, tear-down and moving operations. Though new in concept, the SR-5 contains the tested dependability, low operating and maintenance features of Electro-Motive SR-10 equipment.

The Basic SR-5 set is a two generator, two drive-motor arrangement. By combining units, drilling power can be tailored to the job for the most economical power arrangement. Skid unit is pictured with a Detroit Diesel engine, though any engine (gas or Diesel) of comparable power may be used.



Driller's Control

Simple control panel of SR-5 requires no special training or electrical knowledge. Sensitivity of controls permit driller to maintain a high drilling rate with complete accuracy and balance.



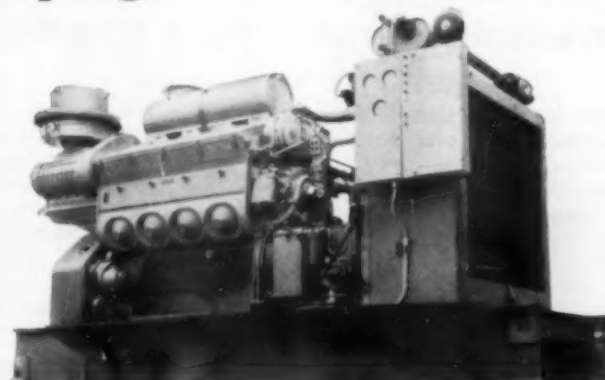
D-49 drive motor

The SR-5 utilizes standard and tested motor components. Electro-Motive drive motors are perhaps the most widely used electric motors for drilling applications. Their dependability and torque characteristics offer speed and power flexibility to meet all drive requirements.

—for dependable pumping **THE SK-10**

For large capacity pumping operations, the Electro-Motive SK-10 provides a compact and portable skid unit, complete with cooling system and engine controls. The seasoned 567 engine is well suited to the torque and horsepower requirements of pumping applications. The engine is balanced to eliminate any vibration between the set and accessories.

The dependability, low maintenance and economical fuel characteristics of the SK-10's engine have been inherited from General Motors' more than twenty-seven years of Diesel engine manufacture. SK-10 units are available for Dual-fuel operation and heat exchanger cooling.



(Shipping Wt. 32,000 lbs.)

ELECTRO-MOTIVE DIVISION • GENERAL MOTORS

LA GRANGE, ILLINOIS • **Petroleum sales offices:** Houston and Los Angeles

In Canada: General Motors Diesel Limited, London, Ontario

Smooth Operator!



Cat's new wheel Traxcavator features fast-working power-shift transmission with Twin Disc Torque Converter

Time was when wheel-type loaders were viewed with scorn as little more than overgrown agricultural machines. But in the years since World War II, the wheel loader has gained universal favor with construction men. Its speed and mobility have proved to be real production-boosting advantages in many types of loading jobs.

Now, after years of research and engineering plus more than 14,000 machine test hours, the 944 Traxcavator — first wheel loader to bear the famous Caterpillar trademark — has made its appearance.

There's no need to enumerate the 944's many design and performance features. These have been given wide coverage in all the construction maga-

zines. It is worth pointing out, however, that the new wheel loader, like so many other Cat machines, is equipped with a Twin Disc Torque Converter.

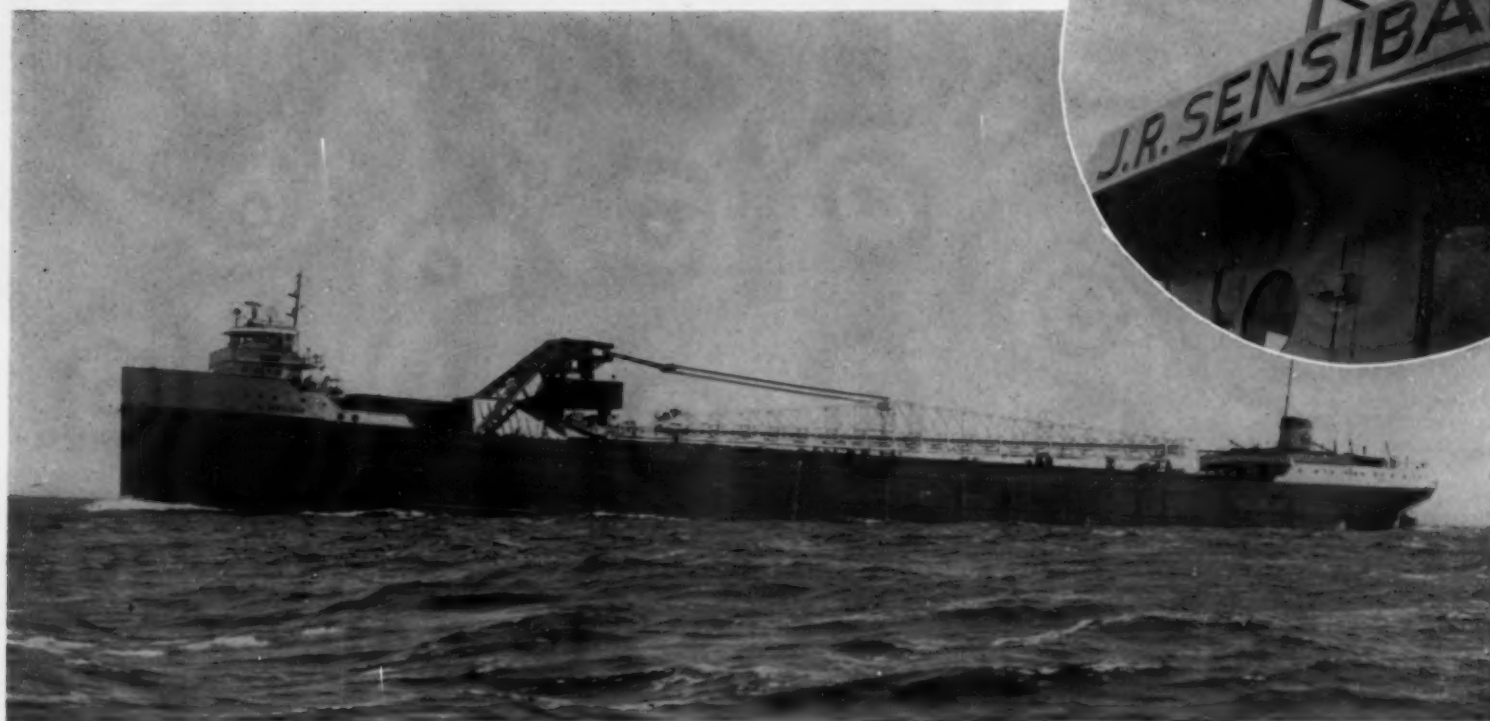
The torque converter — a single-stage Type 6 model — works in conjunction with the 944's two-speed forward, two-speed reverse, planetary transmission. Each of these four inline gear trains has its own clutch. Two of the planetary trains are for direction control while the other two provide gear speed selection. Reverse speeds are 25% faster than forward — a key factor in reducing cycle time. The torque converter assures smooth, instantaneous clutch engagement by absorbing the shock of the shift in its fluid circuit.

It takes an actual demonstration to fully appreciate the smooth, effortless response of this power train. Your Caterpillar Dealer will be glad to show you what the Cat 944 Traxcavator can do.

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin. Hydraulic Division: Rockford, Illinois.



DIESEL REPOWERS COAL SHIP



Self-unloading coal carrier, *M/V Sensibar*, modernized and repowered from steam to diesel by the Christy Corp., for increase of nearly 3 mph over her old speed. Vessel is owned by the Columbia Transportation Division, Oglebay Norton Co., and is now propelled by a Nordberg 3200 bhp diesel engine.

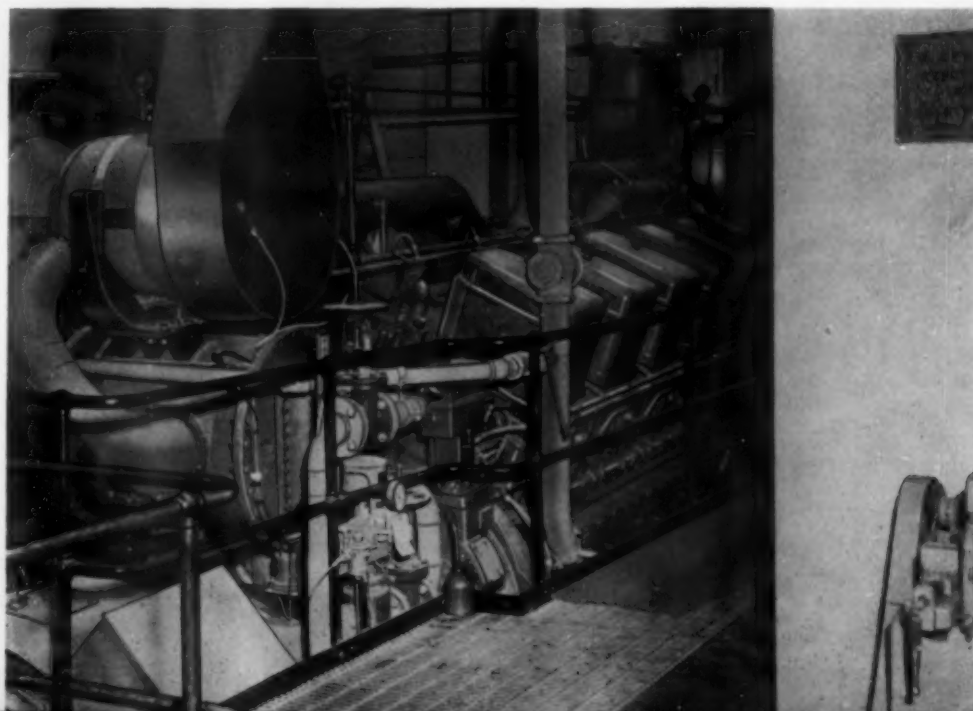
THE newly converted 552 ft. bulk cargo carrier, *M/V J. R. Sensibar*, owned and operated by the Columbia Transportation Division, Oglebay Norton Co., Cleveland, and modernized and repowered by the Christy Corp., Sturgeon Bay, entered lakes service several weeks ago. Before conversion the owners and builders anticipated a fully loaded speed of 13.5 mph and in-service experience thus far has found performance just over that figure, at about 13.8 mph. On her first voyage in ballasted condition from South Chicago, the *Sensibar* logged just under 15 mph, an increase of about 3 mph over her old speed. The vessel, powered by a 3200 bhp Nordberg diesel engine with a KaMeWa controllable pitch propeller, is now hauling coal throughout the Great Lakes with Cleveland, Toledo, Erie, South Chicago and Oak Creek, Wis., among her ports of call. Capt. Edgar H. Viall, Columbia Transportation's marine superintendent, termed the new propulsion setup "very satisfactory." "We've definitely gained a tremendous improvement in speed and the engine-rudder-propeller combination has given us fabulous handling," Capt. Viall said.

Conversion of the *Sensibar* was one of the largest contracts undertaken on the Great Lakes during a single winter season. Originally a bulk carrier,

the *Sensibar* was converted and repowered for dredging. Then in 1941, the dredging equipment was removed and the ship was converted to a self unloader. The contract performed by Christy over the last winter called for removal of the old steam turbine electric drive, including shafting, bearings, propeller, rudder, and steering gear and replacing it with a diesel propulsion and unloading system power plant and installation of diesel-electric units for conveyor and auxiliary power; removal of all forward living quarters; raising and remodeling all cargo hatches; extending and re-

building cargo hold conveyor system; building and installing a new 260 ft. aluminum boom; reinforcing and fastening the old A-frame and completely rewiring the vessel. Further modernization is contemplated for the 1960-61 winter season when the *Sensibar* is scheduled to be lengthened 60 ft. to increase cargo capacity and deadweight at the American Ship Building Co., South Chicago, Ill.

The new propulsion and unloading system power plant consists of a Nordberg type FS-1312-HSC, 4 cycle, Supairthermal, non-reversing marine die-



Drive end of the Nordberg diesel which is equipped with dual DeLaval turbochargers and Young Intercoolers. Zallea exhaust and expansion joints and Burgess-Manning intake air silencers are used.

sel engine with maximum continuous rating of 3200 hp at 515 rpm. This engine is a turbocharged-V-type unit with 12 cylinders of 13½ in. bore and 16½ in. stroke.

The engine drives a KaMcWa controllable, reversible pitch propeller through a Western Gear model 480, MGV 240A vertical offset reduction gear with a ratio of 3.32:1 to provide a propeller speed of 155 rpm. The reduction gear is provided with a Kingsbury thrust bearing, quill shaft and Wichita pneumatic clutch. Function of the clutch is to disengage the gear when the main engine is used to drive the Electric Products generator for electric unloading power. This generator is rated 800 kw, 450 volt, 3 phase, 60 cycle and is directly connected to the engine flywheel. Its shaft is supported by two bearings and is connected to the reduction gear quill shaft with a flange coupling. This quill shaft extends into the pneumatic clutch which connects the engine to the gear pinion. When the generator fields are not energized, the rotor turns free.

A five-position pneumatic selector valve in the main engine room sets control conditions as follows: neutral; engine room control of speed and pitch and bridge control of speed and pitch; split control for bridge pitch and engine room speed control; and the generating condition. When the engine is used for unloading power automatic pneumatic interlocks prevent damage due to operator error and provide automatic engagement and disengagement of the Wichita clutch.

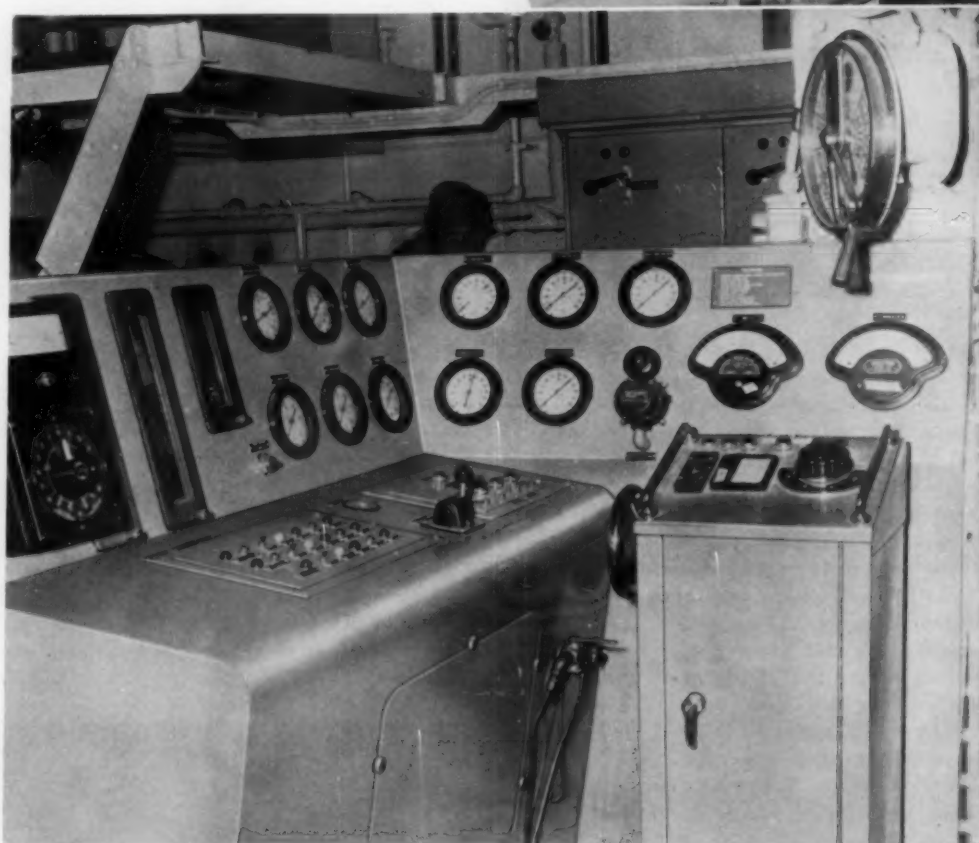
The KaMcWa controllable pitch propeller has four blades, is 13 ft. 6 in. in diameter with pitch controlled from ahead to astern. Hydraulic pressure for pitch change is provided by a main pump chain driven off the propeller shaft and a motor standby pump which cuts in when the main pump pressure drops during maneuvering. Output is sufficient to change propeller pitch from full ahead to full astern in 15 seconds.

A new control to regulate both engine fuel and rpm to suit the loading (rpm and pitch) of the controllable pitch propeller is installed on the *Sensibar*. This control combines a Westinghouse Air Brake pneumatic system with two Woodward

governors, one for fuel regulation and the other for pitch regulation. The pitch governor is driven from the propeller and automatically regulates propeller pitch relative to shaft rpm to prevent engine overload. The Westinghouse single lever

The Nordberg marine diesel drives a controllable, reversible pitch KaMcWa propeller through vertical offset Western reduction gear (3.32:1) equipped with Wichita pneumatic clutch. 800 kw Electric Products generator is direct-connected to engine. Its shaft, flange-coupled to the gear, turns free during propulsion. Note one of three Woodward governors on the vessel.

Main control station in the engine room is equipped for both automatic as well as manual control of propeller pitch. At this station the pneumatic clutch is disengaged and the engine generator energized for unloading power. Stand also has all engine instruments including Alnor pyrometer.



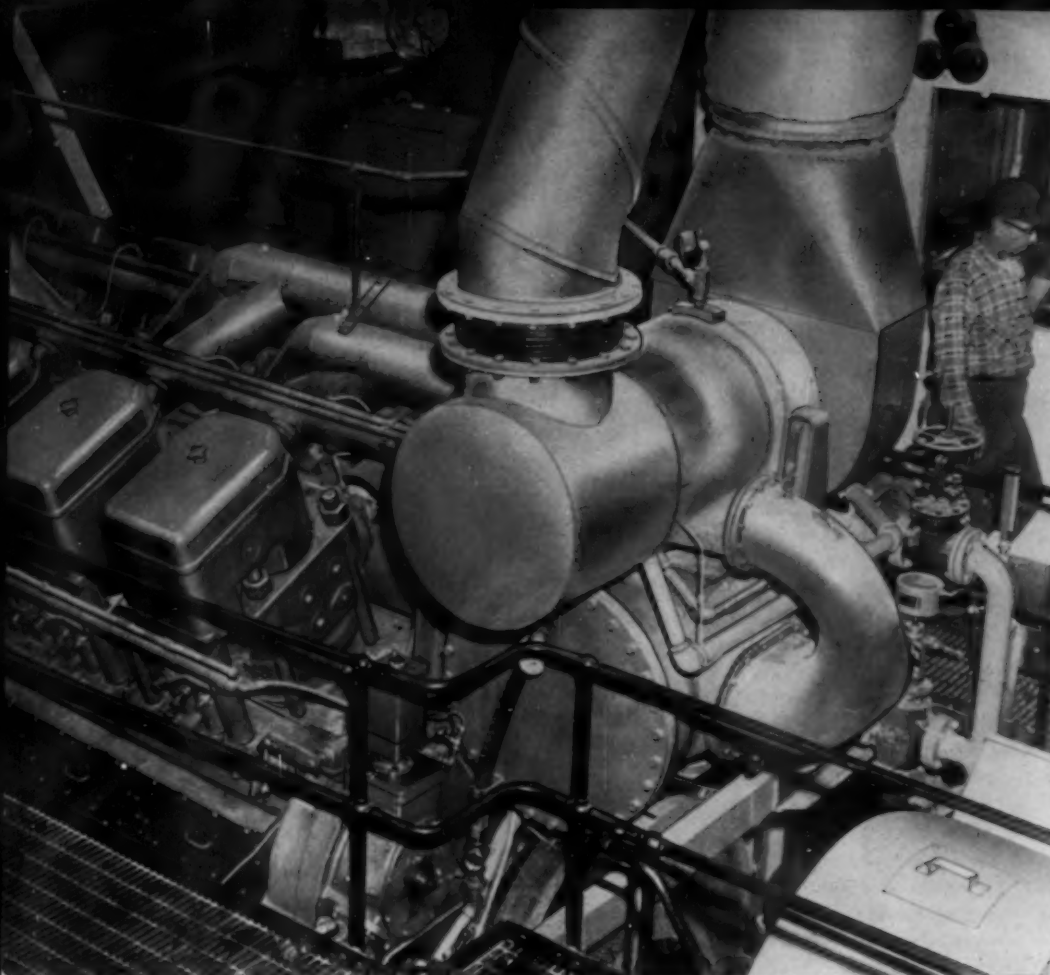
Captain of the *Sensibar*, Clarence Mc Tevia, at the Westinghouse Air Brake bridge engine-propeller control stand.



stands to control both pitch and speed are installed on the bridge and in the engine room. Slave stands on the bridge wings are mechanically connected to the bridge control stand. Movement of the control lever rotates cams to obtain desired engine speed and propeller pitch coordination over the total control range. Cam movement transmits air signals to the propeller pitch positioner at the oil distribution box, the engine fuel governor and the propeller pitch overload governor. The engine room control stand is also equipped for direct mechanical control of propeller pitch. Mechanical control is automatically engaged on

the loss of control air pressure in the pneumatic system and emergency control of engine speed is obtained by manual adjustment of the fuel regulating governor. The engine, in addition, is also equipped with an overspeed governor.

By going to a diesel propulsion unit, the size of the engine room was reduced considerably, allowing increased cargo space. The cargo hold self-unloading gear was extended under this new space to take full advantage of the increased cargo capacity. Maximum midsummer deadweight was increased 600 short tons to 11,800 tons and maxi-



mum coal cargo capacity boosted from 9,300 short tons to 10,500. The vessel's statistics after the repowering follow:

Length overall	552 ft., 1 in.
Length between perpendiculars	530 ft.
Beam, molded	56 ft.
Depth, mid. to spar deck	31 ft.
Draft, keel, Summer	21 ft. 5 3/4 in.
Max. deadweight, midsummer	11,800 s.t.
Max. coal capacity	10,500 s.t.
Ballast capacity	4,900 s.t.
Gross tonnage	7,522

Ship's service is supplied by two 300 kw, 450 volt, 3 phase, 60 cycle Electric Products generators driven by White Superior model 40-SX-6 diesel engines. The generator sets are located in acoustically treated enclosures—one port and one starboard—just forward of the engine room in the cargo hold to save space and at the same time to make the engine room as quiet as possible. The generators are wired parallel with the 800 kw unloading generator to provide power to the conveyor motors (for cleanup purposes) when the main engine is on propulsion.

The after deckhouse and stack were completely removed for the repowering and a full poop structure and new stack were added. Accommodations for engineers and galley crew, galley, mess rooms and store rooms are furnished in the space. Quarters were renewed below the forecastle deck for the deck crew and conveyormen. A new deckhouse was added for the captain and first mate. Officers were provided with single staterooms; unlicensed personnel have double staterooms. Accom-

modations are provided for 36 men plus two spare crew rooms and two double guest rooms.

During the conversion a new 256 ft. aluminum unloading boom, an increase in length of 60 ft., over the previous boom, was installed. Aluminum was selected for the new boom because of its weight savings of about 25 tons. This saving allowed the existing A-frame and supporting structure to be revised with addition of minor stiffening. A new steel boom of this length would have required replacement of the A-frame. Other advantages of the aluminum boom include reduction of boom swing, tag and topping winch and rigging requirements and a considerable reduction in heeling effect of the boom when swung over the side for unloading. Side trusses of the boom are of Alcoa 2014-T6 alloy; other parts are of 6061-T6 aluminum. The boom was assembled using steel rivets, driven cold, by means of a special squeeze riveter fabricated by Christy. The self-unloading conveyor system has a design capacity of 4000 tons per hour.

Cargo hatches were raised and new hatch covers furnished to give greater cargo cubic capacity and allow a deeper loaded draft assignment. A new increase of about two inches draft at the Summer loadline is anticipated for the lengthened hull due to removal of existing penalties on hatch coamings and house bulkheads and addition of a full poop. Deck stringer and sheer strake doubling is to be added at the time of hull lengthening next winter. The portion of this strapping in way of the new poop has been fitted this year by Christy Corp.

The pilothouse includes a radar, radio direction finder and a public announcing system. Navigating



▲ Hilgard lube oil filter is of the by-pass type and is motor-driven.

equipment reinstalled was new in recent years and found to be in first class condition.

Steam for fuel oil heating, ships heating, deck winches and boom swing winches is supplied by a package boiler with capacity of 10,000 lbs. per hour at 125 psi. All electric power is distributed through the main switchboard and control centers for ships service and unloading operation. The main switchboard and control centers were fabricated by Christy. Motors for the new boom, incline conveyors and boom hoist were furnished by Westinghouse.

Contract plans and specifications for modernization of the *J. R. Sensibar* were prepared by R. A. Stearn, Inc., naval and marine architects, of Sturgeon Bay, with Meissner Engineers, Inc., Chicago, preparing plans for the boom.

Principal Equipment M/V *J. R. Sensibar*

Main Propulsion Engines	Nordberg
Turbochargers	DeLaval Steam Turbine
Intercoolers	Young
Governors	Woodward
Unloading generator	Electric Products
Reduction gear	Western Gear
Clutch	Wichita
Pneumatic controls	Westinghouse Air Brake
Intake silencers	Burgess-Manning
Exhaust silencers	Kittel
Lube, jacket water coolers	Ross
Intercooler temp. control	Fulton Sylphon
Lube, water temp. control	Amot
Air compressors	Quincy
Expansion joints	Zallea
Lube oil bypass filter	Hilgard
Pyrometer	Alnor
Auxiliary lube pump	DeLaval Inc.
Fuel filters	Purolator
Ship Service, Auxiliary Engines	White Superior
Generators	Electric Products
Lube, jacket water coolers	Ross
Temperature control	Amot
Fuel oil heaters	Davis
Lube oil purifiers	DeLaval

NEW I-H DIESEL ENGINE FOR LIGHT TRUCK SERVICE

FOLLOWING up its introduction of the mid-duty horsepower UD-282 diesel engine for heavy-duty applications in off-highway machines and tractors, International Harvester recently began production of a new version of that engine, this one specifically engineered for the local truck freight pickup and delivery market.

The new six cylinder engine, designated the D-301, offers good installation flexibility and operating economies for many types of short haul, light load operations with straight trucks. Designed, engineered and manufactured by IH specifically for International trucks, the new engine will be available in I-H's conventional B-160 and BC-160 series, for straight truck use. Models in these series are rated at 16,000 to 19,000 lbs. gvw.

A number of engine manufacturers have been working with designs for a diesel engine for light truck use. In its new model, International believes it has a diesel that will give performance and fuel economies that will be attractive in such operations. Characteristics of the new International engine include high torque output at low speed, low fuel consumption and long operating life with low service requirements.

The new engine is a lightweight unit, dimensionally similar to carburetor engines already in use in I-H trucks for similar service. The 4 stroke, 6 cylinder D-301 is rated 110 hp at 3000 rpm with a bore of 3.812 in. and stroke of 4.390 in. Compression ratio is 18:1 and displacement is 301 cu. in. The engine weighs 902 lbs. dry, giving it a

weight/hp ratio of 8.2. The D-301 is only about 200 lbs. heavier than the comparable International Black Diamond gasoline engine.

The D-301 is a near-twin to the UD-282 introduced by the company in 1958 and described in our October 1958 issue. Both engines are rated 110 hp at 3000 rpm. The primary difference between the two is the piston displacement; 301 cu. in. for the 301 and 282 cu. in. for the 282. The difference results from elimination of cylinder sleeves in the D-301, giving it a .125 in. larger bore diameter. Thus, only the crankcase bore, pistons and rings differ in the two engines. Crankcase castings for the D-301 have been alloyed to improve compatibility of pistons and bore on this engine.

"Extensive tests of preproduction models under operating conditions have produced impressive fuel mileage records, along with consistent troublefree service," said L. W. Pierson, manager of sales for the I-H motor truck division.

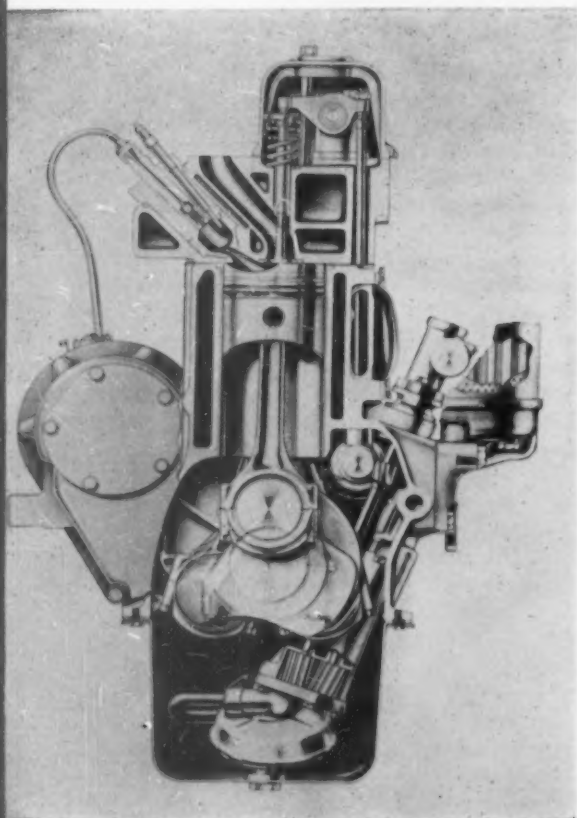
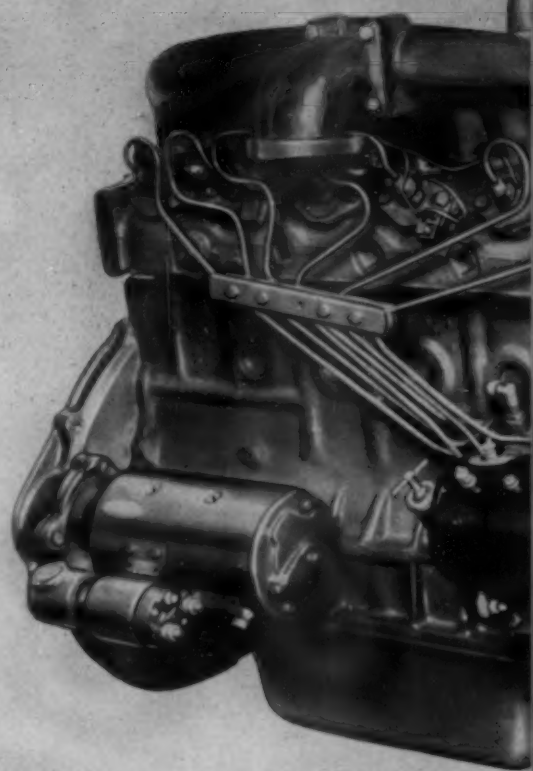
In an earlier discussion of the D-301 a company official pointed out that gasoline engines in pickup and delivery service have always been sleeveless. "We feel a sleeveless diesel is completely acceptable," stated the representative, "Thousands of hours at 3,000 rpm in the laboratory, in proving grounds dust and in customer vehicles have supported this viewpoint." Another I-H lightweight diesel engine, the D-252, also is sleeveless.

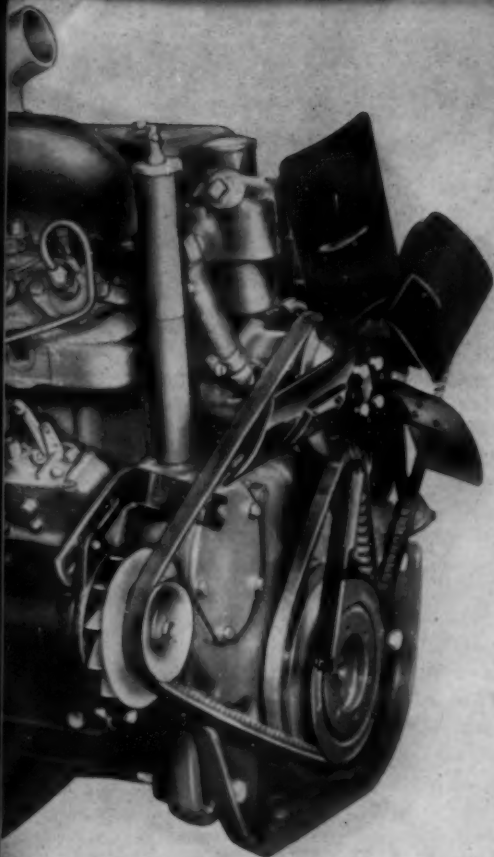
Features of the new power plant include low friction aluminum alloy pistons, pre-combustion type high turbulence combustion chamber design for greater fuel economy and heavy duty design for both the crankcase and the crankshaft. The deep I-block crankcase is internally ribbed for the extra strength and rigidity required for long life operation under heavy power demands. This heavy ribbing, plus thick webs for each of the four main bearings, eliminates cylinder distortion and provides rigid mounting for the crankshaft. Large full length passages permit coolant to circulate freely around the cylinder walls to maintain uniform temperatures at all engine loads.

The fully hardened crankshaft is forged from C-1046-FQ steel for strength and durability. Counterbalancing insures smooth engine operation and eases loads on the four copper lead main bearings and on crankshaft bearings. Spring loaded seals at the ends of the crankshaft minimize oil loss. The crankshaft is 34 $\frac{3}{8}$ in. long and weighs 111 lbs. The crankcase is of alloy iron specially cast to increase wear resistance. The aluminum alloy dished-top pistons are designed to effectively conduct heat

New International D-301 engine installed in B-160 truck. Engine weighs only 902 lbs., or 8.2 lbs./hp. Note Roosa Master fuel pump.

New D-301 engine is near-twin to D-282, cutaway of which is shown, except that D-301 does not have cylinder sleeves.





Product view of new International D-301 diesel engine, rated 110 hp at 3000 rpm. Engine, with bore and stroke of 3.812 x 4.390 in., is designed for local truck freight pickup and delivery use.

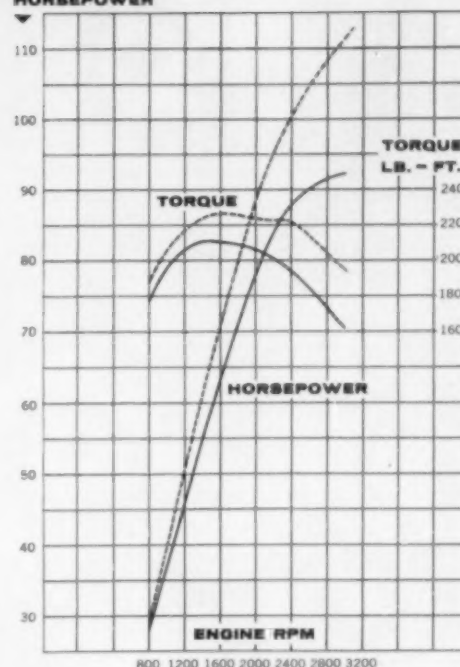
to the jacket coolant. Each piston has two compression and one oil control ring.

Exhaust valves are 1 19/64 in. diameter and of Thompson MS-201 nickel alloy, resistant to warping and cracking. Carbon buildup on exhaust valves is prevented by use of positive valve rotators, assuring positive seating. Intake valves are Silichrome XB with 1 1/4 in. head diameter; stem diameter is .372 in.

Fuel is fed to the conical precombustion chamber by a Roosa Master distributor type fuel pump and I-H spring loaded differential pressure-type injection nozzles. Pressure lubrication is through full flow filters and drilled passages to assure protective lubrication under the most adverse conditions. A built-in oil cooler controls oil temperature during engine warmup and under heavy operating conditions to help prolong engine life.

Starting is by a 12 volt starting system. Individual glow plugs in each precombustion chamber allow ease of engine starting. The engine is designed to operate on No. 2 diesel fuel.

BRAKE HORSEPOWER



PERFORMANCE CURVES

- Solid line curves are for engine with fan, air cleaner, generator, muffler, tailpipe and vacuum pump.
- Dotted line represents maximum output without above accessories corrected to 29.92 H.G. barometric pressure and 60° F. air temperature.

International B-160 truck is one of series that will be powered with D-301 engine. Designed for short haul, light load applications, the series models are rated at 16,000 to 19,000 gvwt.



OIL SEARCH AT YAKATAGA BAY

In a remote location surrounded by mountains, glaciers, and the sea, where there is only about 2½ hours of daylight in 24, and where there is an annual rainfall of 180 ins., some daring Americans are drilling a well in search of oil. Using a rig that is partially enclosed for protection against high, frigid winds, they live in a camp a few miles from the drilling location, but have an emergency crew-house at the site in case it is needed. All food and fuel oil is flown in.

Employed by the Clyde Hall Drilling Co., of Bakersfield, Calif., the men are drilling a well near Yakataga, along the Gulf of Alaska in south-

ern Alaska. The location is two miles inland from the gulf, and five miles from the face of the Bering glacier. The well was spudded in during December 1959, after five months of preparation and expenditure of \$1.5-million. Rains, which started two weeks earlier than usual, caused a 2½-month delay.

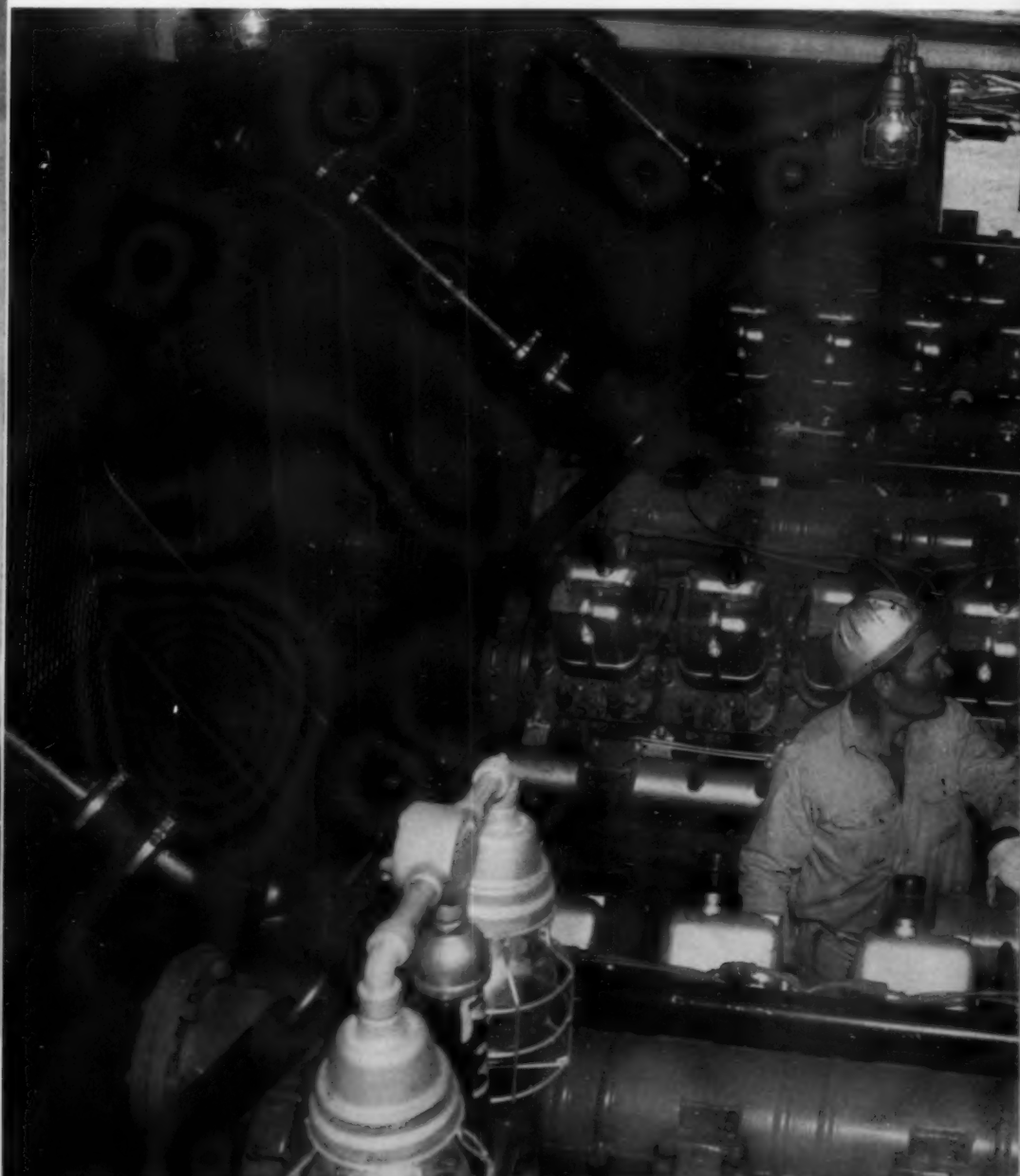
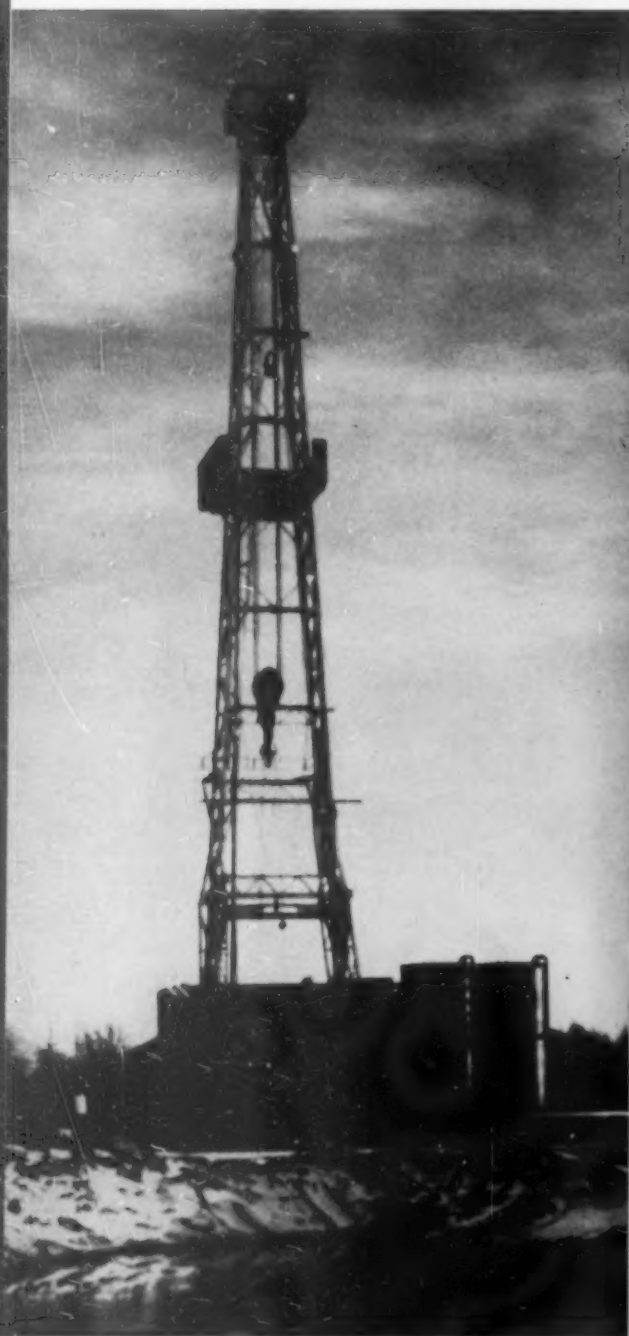
Before drilling could begin, the rig and much special equipment had to be brought, 3500 mi. from Los Angeles, Calif. The move, from Los Angeles Harbor to Yakataga Bay, was made in two LSM's and an LST. The LSM's carried the loads the rest of the way to Yakataga. From here a rig road leads 23 mi. to the drilling location.

The rig is a National Type 110, powered by three Waukesha VLRDB diesel engines, with a 142-foot Lee C. Moore mast. It was rigged up and given a test run at the Clyde Hall Co. headquarters yard, south of Bakersfield. Because of this advance work, the rig-up at the drilling location was completed in one week. The entire rig, including mud tanks and pump manifolding, is located in a compact space 50 by 100 feet, which is enclosed on all four sides with carefully-designed steel panels as protection against the weather.

The three Waukesha VLRDB diesel engines are each rated 825 hp at 1100 rpm. The 12 cylinder, four stroke, Vee-type engines have a bore and stroke of 8½x8½ in. They drive through Ideal Gyrol Type B fluid drive couplings and are equipped with Waukesha model FC engines for starting. Rig equipment includes a type MS-27½ rotary, a 3-section drive group, a G-1000-B and a C-350 slush pump, an N-815 swivel, a 548-F-300 hook-block, a 5¼ by 40 kelly, a Type "AS" roller kelly bushing, and a type "D" wire line anchor, all by National Supply, and a Martin-Decker type "D" weight indicator.

↙ Clyde Hall Drilling Co., rig shown on location near Yakataga, Alaska. Daylight lasts about 2½ hours each day in this area.

↘ The three Waukesha VLRDB diesel engines which power rig equipment at Yakataga during rig-up before shipment. These engines are rated 825 hp at 1100 rpm. Note Winslow lube oil filter.



Another view of engine enclosure. In the foreground are the National C-350 and G-1000-B slush pumps.

The engines and drive group are equipped with National 270 hydraulic couplings, which because of their scoop control serve as engine clutches. A National auxiliary drawworks drive, sometimes known as "the run-around," and a National No. 6 drilling control, provide additional efficiency and ease in operating the rig.

Careful preparation of equipment was essential, because during the winter, when storms close the shore for water transportation, all needed supplies must be flown in from Cordova, 100 mi. away, where the harbor facilities can be used all year. The population at Yakataga consists of five families, who keep the air strip open.

All fuel oil for the rig is flown in a C-47 tanker plane, with a capacity of 2,000 gals. Temporarily pumped into a rubber storage bag, with a capacity of 10,000 gals., located near the runway, the oil is trucked to steel tanks and another rubber storage bag at the rig site. Normally, the rig uses about 1,000 gals. of fuel a day.

Much of the road is built on muskeg, which provides a firm foundation only when frozen. During the building of the road, some trees, when pushed

by a bulldozer, simply moved to one side instead of falling, and continued to grow in the marsh-like ooze. Much of the gravel used in forming the road sank into the muskeg. The camp is located about a mile from the air strip. Wooden trailer houses provide accommodations for eight men each and, in addition, the camp includes a recreation hall, dining room, kitchen, and a room equipped with washing machines and driers.

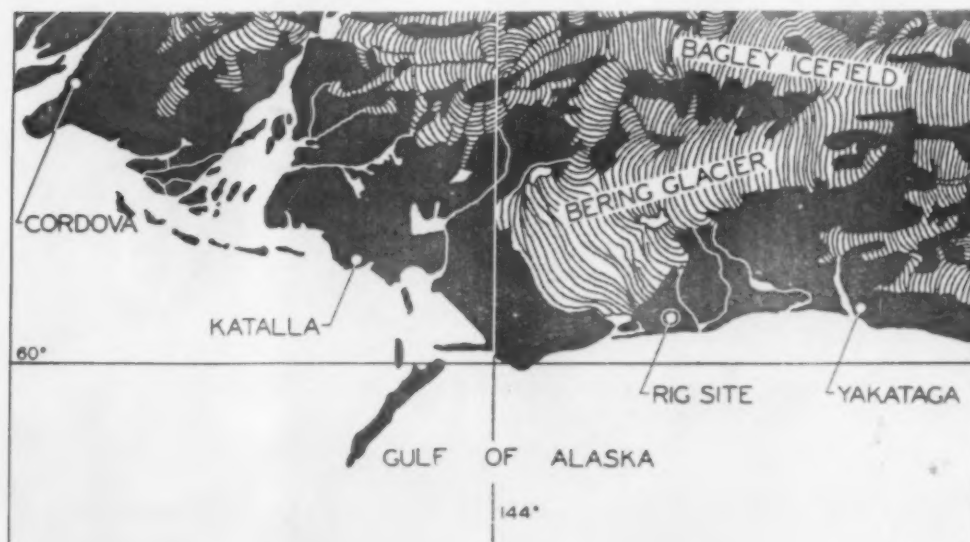
At times, more than 50 men are located here. In addition to Clyde Hall employees, these include representatives of the supply and service companies. A trailer for the Clyde Hall tool pusher and another trailer to house a drilling crew, are located at the rig site. Food supplies and cooking facilities are on hand in case of emergency.

For self-sufficiency, a cementing unit, mud-logging unit, and surveying unit are kept at the location. When required, additional service company personnel for operation of these units are flown in from Anchorage.

Principal Equipment Serving Waukesha VLRDB Engines

Governor	Woodward
Fuel oil filters	Fram
Fuel injection pumps	Robert Bosch
Lube oil filters	Winslow
Heat exchangers	Ross
Safety alarm controls	Fulton Sylphon
Exhaust pyrometers	Alnor
Instruments	Stewart-Warner

Map showing site of drilling operation in Alaska. Rig road extends 23 mi. from air strip at Yakataga. Food, fuel and special equipment are flown to Yakataga from Cordova.



POWER CARS AID BRAZIL

EARLY in June 1959 a severe drought brought on a critical power shortage in Belo Horizonte, capital of the state of Minas Gerais in Brazil. The local power company, Cia. Força E Luz De Minas Gerais, a subsidiary of American and Foreign Power Co. Inc., and CEMIG, the state power agency from which Cia. Força E Luz purchased part of its electrical requirements, normally produced most of their power at hydro plants. But these had a greatly reduced capability because of the lack of water.

The Federal and State governments asked American and Foreign Power to take prompt action to provide a solution to this problem. Henry B. Sargent, president of the company, responded by promising that 10 diesel generating units would be installed within two months. Fortunately, American and Foreign Power had a good background of experience in dealing with similar problems in other countries. Over a period of years they had acquired 40 General Motors model M-16 1000 kw mobile diesel Power Cars which could be moved quickly to meet any emergency.

Output capacity of each M-16 Power Car is 1000 kw at .8 power factor, 4160/2400 volt, three phase service. Prime mover is the GM 16-567C diesel engine. The ac generator is rated at 60 cycle, 2400/4160 volt, three phase, 1250 kva, 720 rpm. They are built by General Motors' Electro-Motive Division at La Grange, Ill.

Eleven of these GM Power Cars were taken from overseas locations where they were no longer urgently needed and brought to New Orleans,

U.S.A. for preparation for their ocean voyage to Brazil. Meanwhile, the power company was preparing the installation site at Belo Horizonte and investigating the problems involved in moving the

The 11 M-16 Power Cars after installation on the site at Belo Horizonte, Brazil. Each unit consists of a GM 16-567C diesel engine driving a 1000 kw generator.

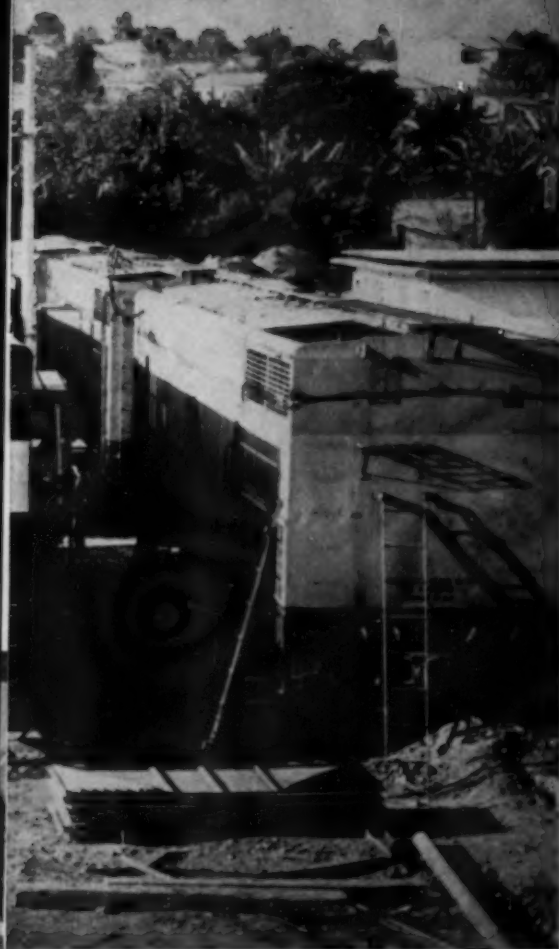


cars from the port at Rio de Janeiro to their final location at Belo Horizonte. One difficulty was that the cars originally were equipped with U.S.A. standard railway gauge trucks while the Brazilian gauge on the railway to Belo Horizonte was 1.60 meters. The problem was solved when the Central do Brasil railroad made spare trucks available and adapted them for use with the GM Power Cars.

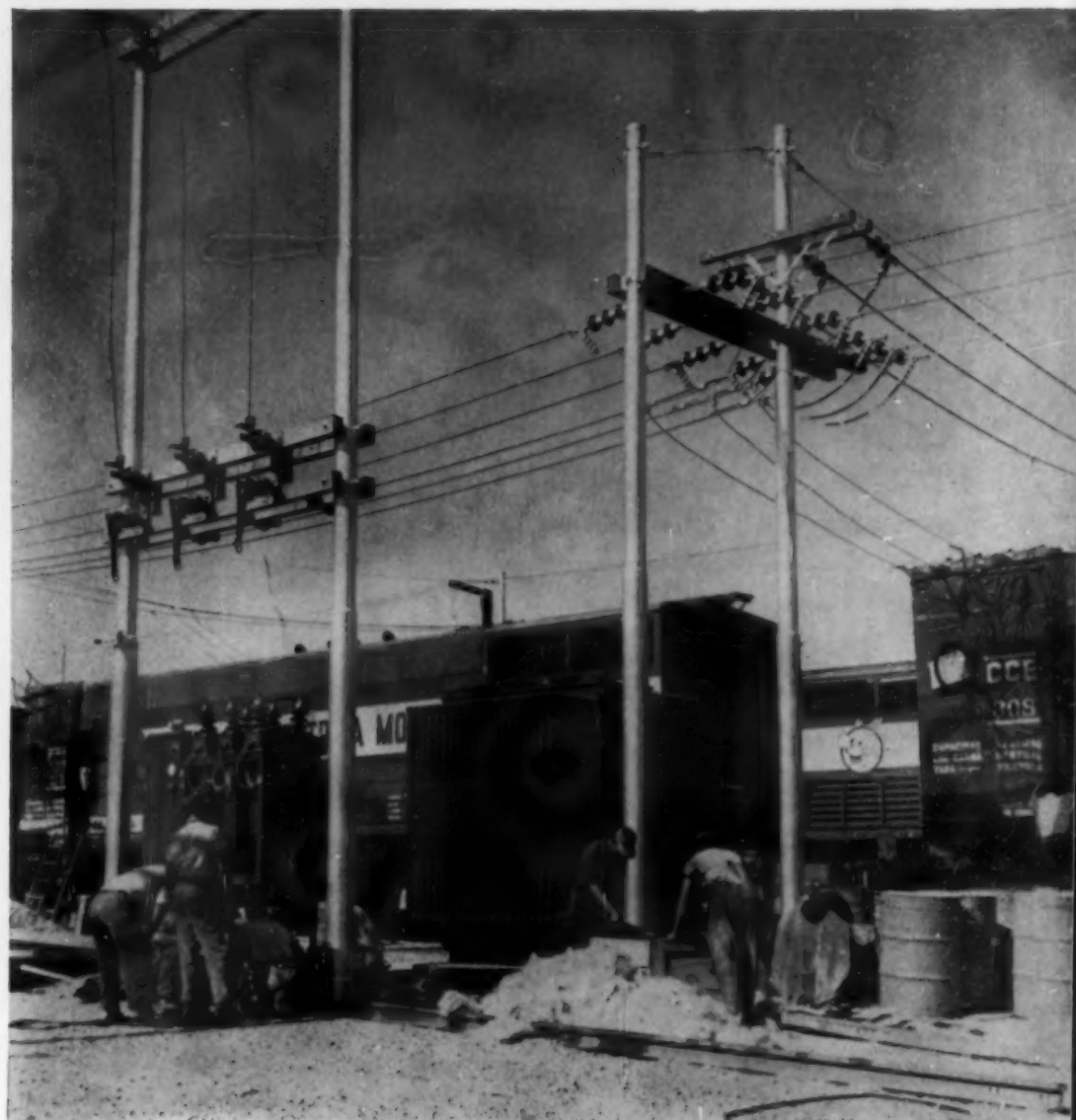
As a result of the careful planning and cooperation of all parties involved, the first units were placed in operation within 45 days and all 11 units were on the line in 55 days, well within the period of two months promised by Sargent. General Motors do Brasil, S.A., Sao Paulo, provided a diesel technician to help the power company's engineers get the units into service. The units were operated at full load for 24 hrs. a day with a weekly shutdown of only three to four hours to permit normal operating inspections and adjustments.

Although this additional generating capacity of 11,000 kw could not relieve the entire power shortage in such a large metropolis as Belo Horizonte, it did prevent a power crisis that could

Large mobile cranes were used to lift the Power Cars onto concrete piers for semi-permanent installation at the Belo Horizonte site.



After the Power Cars were in place crews connected the power company's lines to the units.



have disrupted essential services. When normal water supplies are available for the hydro plants the 11 units are used for peaking and emergency service. However, if drought conditions should recur in the future, the diesel units could be run on a 24 hr. base load to conserve the water supply.

With the rapid growth of electric power companies, both in the U.S.A. and around the world, General Motors recognized that something larger than the 1000 kw Mobile Power Car would be required. This led to the development of a new series of model MU portable power plants with ratings of 2000, 4000, 6000 and 8000 kw.

Each diesel generating unit rated at 2000 kw is mounted on a skid type base and is completely enclosed in a weather-protective and sound-insulated housing. The switchgear and controls for up to four generating units are mounted in a separate control station which also is completely enclosed and designed for portability. (See DIESEL AND GAS ENGINE PROGRESS, February, 1960; September, 1958 and August 1958) It is expected that these new MU portable plants will be made available for export in 1961.

The diesel-generator sets for Brazil were loaded at New Orleans after they were brought to that port from other overseas locations



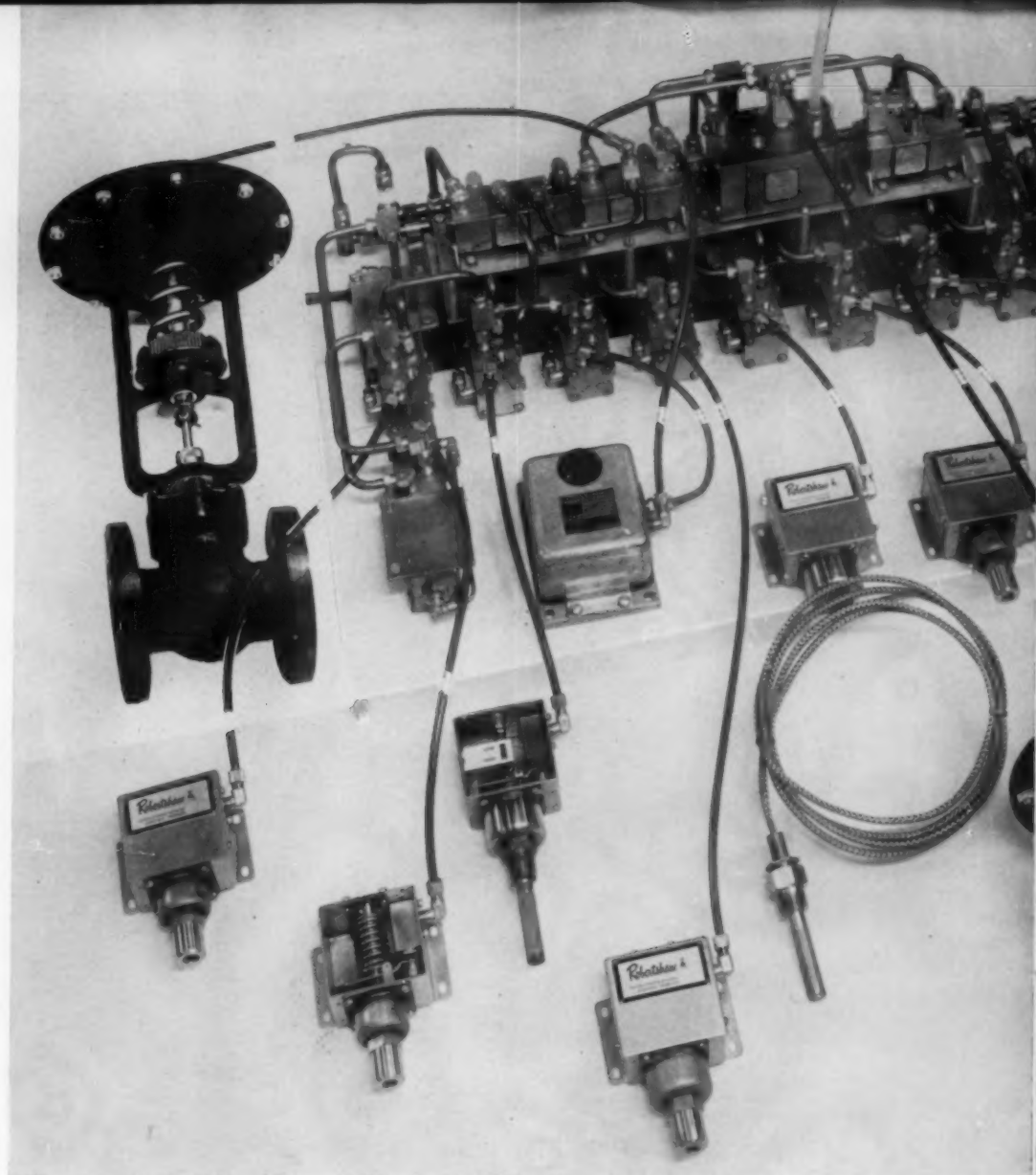
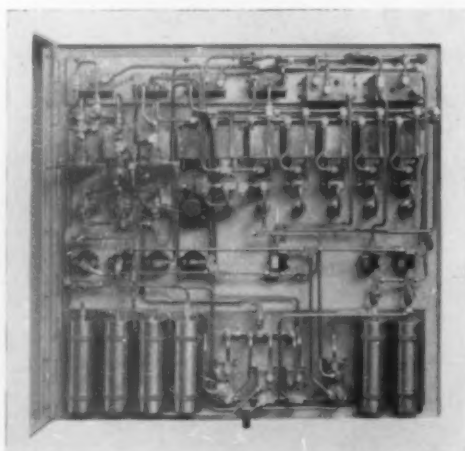
PNEUMATIC-AUTOMATIC CONTROL FOR ENGINES

New Robertshaw System Introduced at Annual OGP Meeting Operates at Low Pressure and Provides Sequence Starting, Loading and Shut-down for Diesel and Natural Gas Engines and Compressor Units

A new control system for automatically starting, loading and shutting down diesel and natural gas engines is now being produced by the Fulton-Sylphon Division of Robertshaw-Fulton at its Knoxville, Tenn. plant. The system was introduced at the ASME Oil and Gas Power Division meeting in Kansas City in late May by W. D. Miller, vice-president and general manager of the Fulton-Sylphon Division. The new unit was demonstrated in a specially-equipped display coach and your DIESEL AND GAS ENGINE PROGRESS editor was on hand to get a first-hand view of the operation of this system.

Completely pneumatically operated, the control system was developed specifically to meet requirements for gas compressor applications but it is adaptable to any internal combustion engine application and also a variety of automated processes. All measurable variables including temperature,

Rear view of demonstration system installed in Robertshaw product display coach. Malfunctions may be simulated to illustrate immediate reaction of safety system in shutting down engine. Sequence start/stop system incorporated including selector valves for automatic or manual sequence starting.



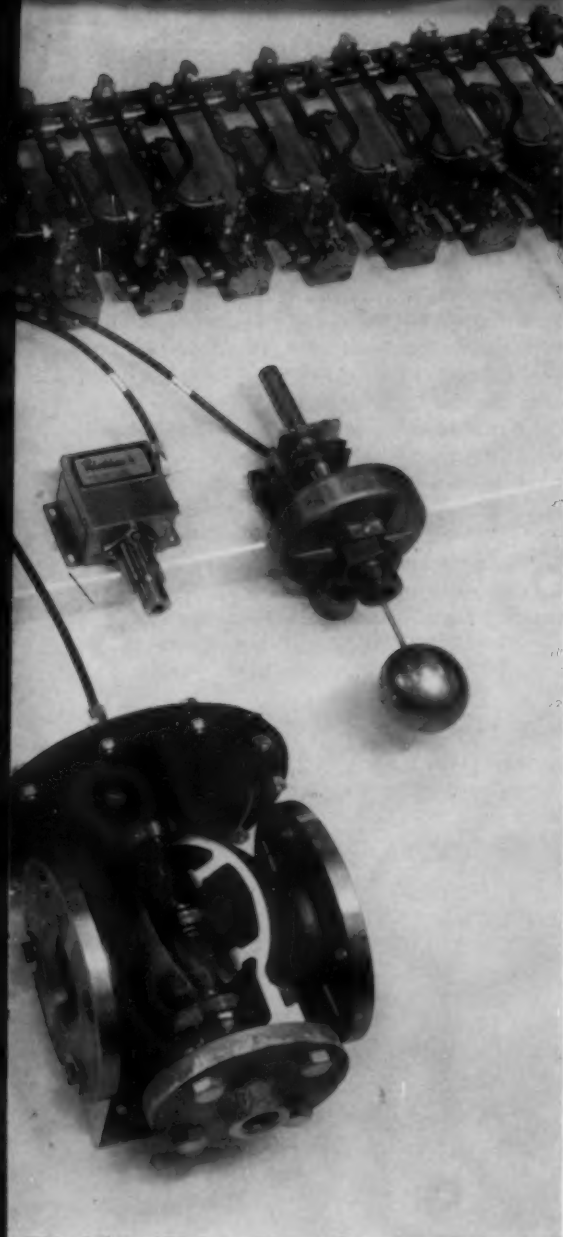
Typical strut-mounted receiver-relay-annunciator safety system showing typical transmitters for temperatures, pressures, liquid level, vibration. Cut-open model of diaphragm actuated fuel gas shut-off valve shows O-ring sealed main ports and vent port.

pressures, liquid levels, vibration and engine speed are monitored constantly. For operation from remote stations the system can be connected to a pneumatic-electronic transducer. The pneumatic system is tied into the engine starting air bottles or can work on natural gas from the regular pipeline supply. In either case, it is a low pressure system functioning at 20 to 30 psi.

The control system can be engineered to monitor any number of different engine and equipment operations and functions and incorporates features to signal or shut down the engine in case of malfunction of any one of an unlimited number of measurable variables. One of the features is the visual flag signal which is "rung up" on a remotely mounted control board when a malfunction occurs and the engine is shut down. The flag indicates the cause of the shut down and is the only signal that shows on the panel even though other monitored functions would normally cause their signal flags to trip as the fuel is cut off and the engine comes to rest. In addition, the system can

be built so that amber signals can warn of a condition indicating an approaching malfunction before the condition reaches the point requiring shutdown. Thus the operator can take steps to prevent the shutdown, if practical. In the event of a major malfunction the engine shuts down immediately. Since the probable cause of the malfunctions is indicated by its corresponding shutdown flag signal, repairs or adjustments can be made without losing time for a search to determine which of many possible conditions caused the shutdown. The non-resetting signal remains visible until cleared, usually by restarting the engine—which can be done only after the malfunction has been corrected.

The Robertshaw system utilizes pressure, temperature, vibration and liquid level transmitters to deliver information to the receiver relays, with their integral annunciators, mounted on the control panel. The non-bleed relay is universal for all engine safety shutdown variables as well as many "alarm only" points. All transmitters are



pressurized from the receiver relay and all employ a snap-acting pneumatic pilot valve, which at a pre-set high or low limit, vents the pressure in the single transmitter-to-relay line. At this partial reduction of the 25 psi loading pressure, the receiver relay is unbalanced, closing the air supply port before the vent port is opened at the transmitter. This system provides "knife-edge" on-off action with no modulation and reduces air volume losses to the volumetric displacement of the particular system.

When a relay is tripped by a transmitter, it "rings up" a flag either red or amber, depending on the setting of the transmitter and the nature of the malfunction. At the same time the relay starts the shutdown procedure, if this is required.

Fulton-Sylphon started early research on the controls principally with the problem of safety shutdown in mind. It soon became apparent, though, that parallel to the safety problem was the need for a coordinated automatic start/stop system. Starting a high-horsepower engine involves a number of separate operations, all of which must be carried out in a set order. Taking that same

engine off the line involves a number of steps, not necessarily in the same sequence, equal to the engine starting operation.

In a typical gas engine compressor application, upon receiving the "start" command usually given by pressing a single button on the control panel or at a remote control station, the Robertshaw system first monitors the various conditions of temperature, pressure, etc. of the engine to determine that all conditions are safe for starting. Settings of suction, discharge and bypass valves connecting the compressor to the pipeline are checked to determine that they are in proper position for starting.

Having determined that conditions for safe starting are met, the first active operation of the controls system is to check and start the auxiliary equipment . . . open air intake filter screens and start pre-lube pumps, jacket water pumps, etc. When the auxiliaries are operating, the control system then will close the blow-down valve and open the discharge valve. The next step, is to admit high-pressure air to the engine to start it rolling. After the engine is purged of any residual gases, the magnetos are ungrounded to provide ignition, the fuel valve is opened and, with the engine running on gas, starting air and auxiliary pre-lube pumps are shut down. The suction valve is opened, the by-pass valve closes, the engine is pumping and engine speed is brought to the proper setting, either automatically or manually.

In general, requirements of a sequence-start system are governed by the rule that "no operation is begun until information is received that all previous operations have been completed and are operating at proper values" . . . should one of the steps be incomplete or fail to function, the controls system will trip, stopping the cycle and shutting down the engine. The cause of the interruption will be indicated on the signal section of the main control board.

Since the control system will measure engine functions which are driven by the engine itself, it was necessary to bypass monitoring of these func-

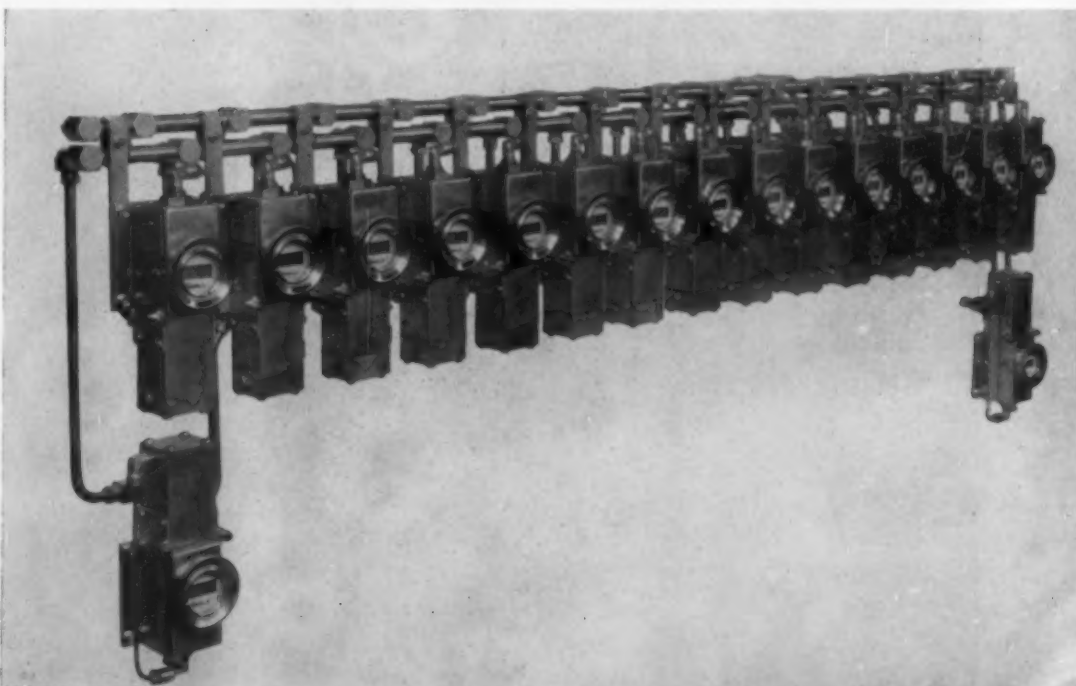


Rendering of complete engine control system panel incorporating sequence start/stop system, safety shutdown system, indicating gages, etc.

tions temporarily in order to start the engine. However, these are automatically placed back in the circuitry as soon as the engine is started and are immediately effective. For instance, as soon as the engine reaches the speed at which the lube oil pressure transmitter takes over from the auxiliary lube monitor it becomes operative and, should lube oil pressure not be up to the required setting, the engine control immediately goes into the shutdown sequence. This malfunction would show on the signal panel.

The pneumatic system is inherently explosion-proof, an important consideration for gas engine service. The "building block" concept provides maximum versatility for engineering the systems to fit anticipated diesel or gas engine applications. Standardized components are interchangeable and the pneumatic circuitry with simplified components is expected to minimize maintenance. Since the pneumatic system is "deadended", there is no consumption of air while the engine is running or during shutdown periods.

Front view of receiver-relay-annunciators strut-mounted for incorporating into already existing panel. Seventeen engine variables will be continuously monitored by transmitters connected to the individual receiver relays.



SMALL TRUCK DIESEL PROFITS BAKERY

By L. H. HOUCK

A 70 hp 4-cylinder Cummins diesel, placed in factory production this January after five years of development and testing, is making diesel history at Joplin, Mo., where it is probably the first diesel engine to be placed in regular service in the tough stop-and-go wholesale bakery fleet service.

A Cummins J-70-B, derated from its normal 70 hp to 50 hp is making regular runs on a 6-day, 175-mile delivery route of the Junge Baking Company, entailing an average of 55 delivery stops per day. It was installed on March 1st and, when visited by DIESEL AND GAS ENGINE PROGRESS on the route, had 8,177 miles on its speedometer, was delivering almost 16 mpg from a starting fuel consumption of 14.5 for a savings of \$100 a month over similar trucks with gasoline engines, and had required no maintenance service.

It is particularly appropriate that this diesel "first" should originate with the 60-year-old Junge Baking Co., headed by Nolan Junge, which is nationally known for many firsts in the baking industry. Ten years ago it developed and manufactured the light-weight aluminum wholesale delivery bodies now used on its more than 80 trucks, which opened up possibilities of new economies in wholesale bakery fleet operation.

Junge Baking Company is also noted throughout

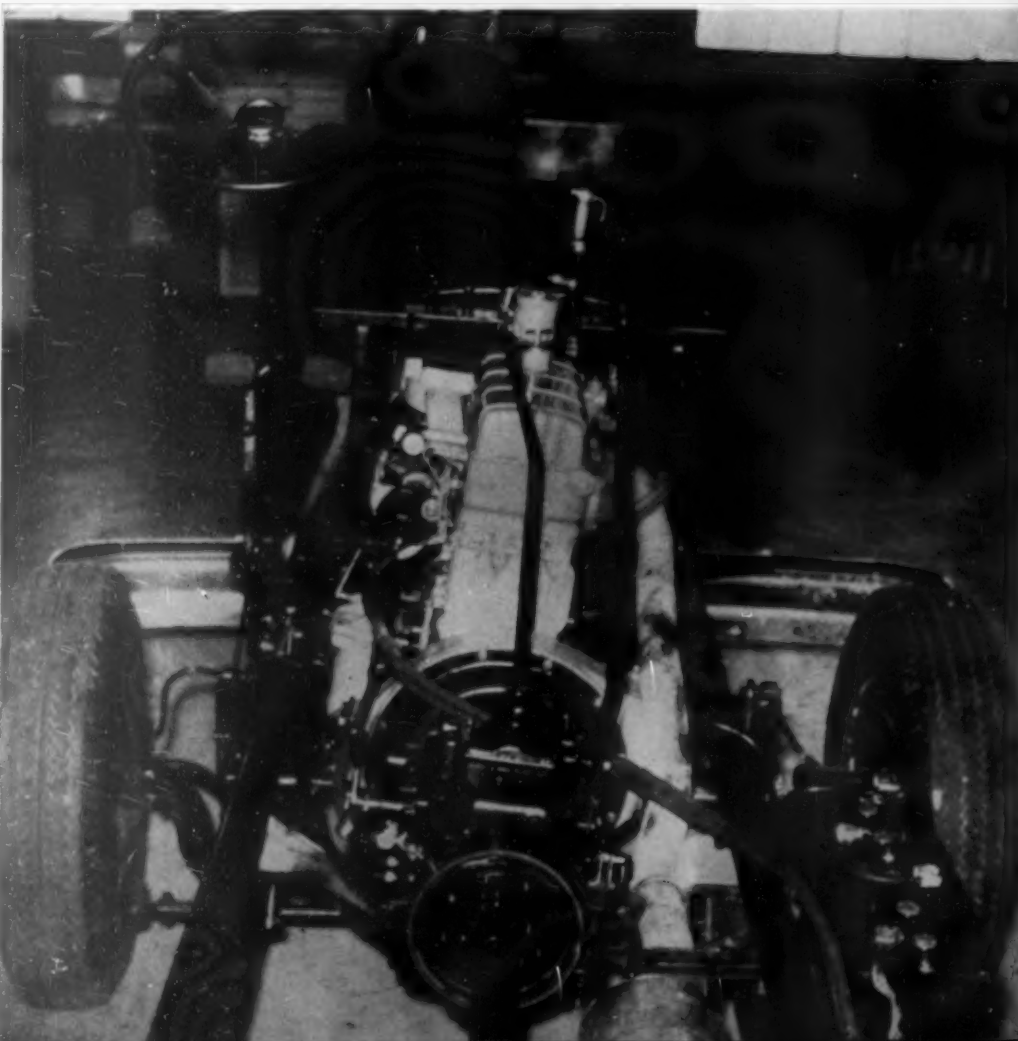
the baking industry for the scope and accuracy of its cost records. Consequently Junge's pilot diesel operation has been set up against an accurate backdrop of operational cost statistics covering all phases of retail stop-and-go delivery service. Nolan Junge, vice-president of the company, is well known throughout the U. S. for his activity in the baking industry on a national scale.

The Cummins J-70-B engine, used in the pilot operation, was developed over a five-year period, for the tough stop-and-go retail delivery market. This is not only a high usage market but an operational area in a squeeze of high operational costs. Costs of fuel, labor, taxes have been steadily increasing the cost of retail delivery. Stop-and-go entails more idling waste, more wear and tear on engines, clutches, drivelines, transmissions, differentials resulting in higher maintenance costs and usually shorter useful life per unit.

The Cummins J-70-B was installed in a chassis delivered to the Cummins Diesel Joplin, Inc. Branch of Cummins Kansas City Diesel Sales Corp. in Joplin, where the installation of the Cummins diesel was supervised by Robert Phillips, branch manager and Robert E. Roebke, of Kansas City, sales manager. This chassis, which on March 1 became No. 431 when the aluminum body was installed, was a 1959 forward control Chevrolet.

Engine, transmission and drive line were removed. Front end was blocked up and an extra leaf added to the front springs to take care of the added weight. The J-70-B weighs 1150 lbs., about 300 lbs. more than the Chevrolet engine. A new 12-in. Lipe clutch was installed, the driveline was reworked using standard U-joints and a Clark model 205-V transmission with overdrive was installed. Chevrolet's rear axle, differential was retained unchanged.

Mounting the engine in the chassis turned out to be uncomplicated. Engine was mounted at a 2 degree tilt to accommodate the body. The vertical space required for the engine as compared with



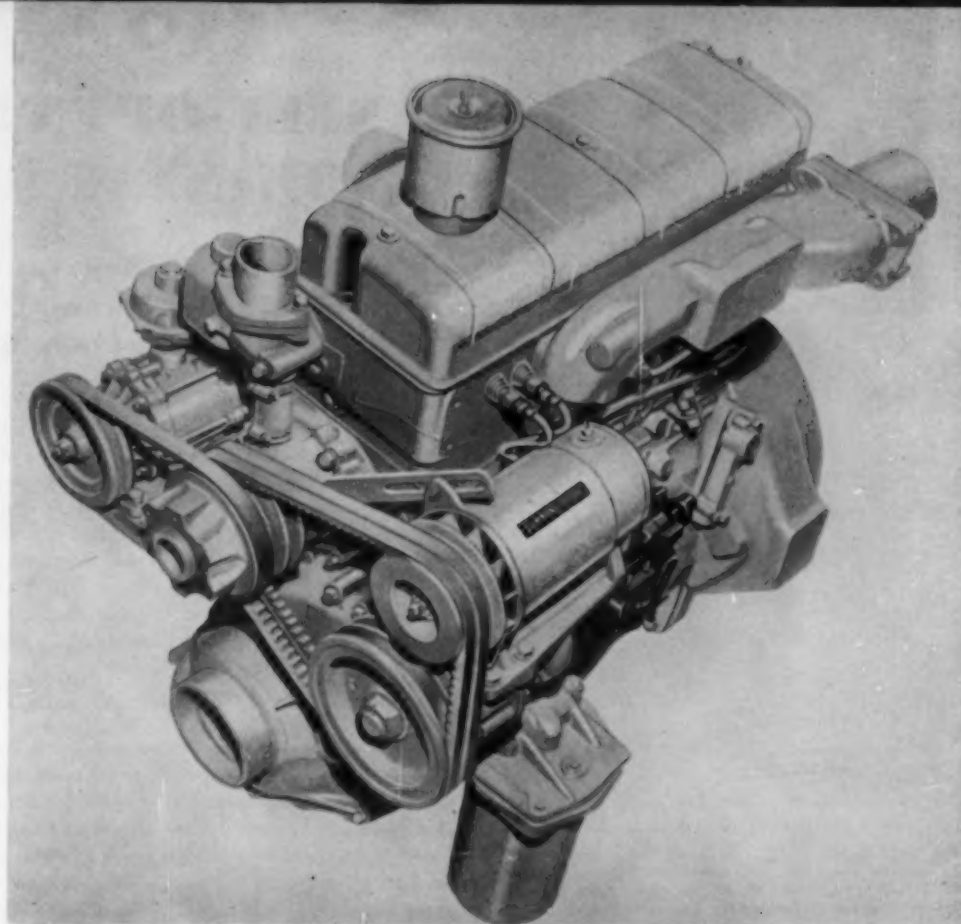
Driver making delivery on one of more than 55 stops on 175 mile route. Truck is 1959 forward control Chevrolet.

◀ Cummins J-70-B engine installed in delivery truck chassis. Engine was derated to 50 hp from normal 70 hp rating for this installation. Engine drives through Lipe 12 in. clutch, Clark 205-V transmission with overdrive.

the original was less than three inches greater, resulting in no load loss in the driver's compartment. A new generator and starter were installed, and the key start feature was retained. In fact, there were no additions or changes in control inside the cab for the driver to learn. The features of instant key start for a diesel in stop-and-go service are invaluable since the driver makes more than 55 starts per day. The new engine uses the time-tested Cummins PT fuel injection system and a Vortex oil bath air cleaner.

The engine was de-rated by decreasing the PT fuel injection pressure as a means of providing only as much power as needed for the job and thus increasing the life of the engine and decreasing fuel costs. Should more power be required the additional 20 hp can be turned on in a matter of minutes by raising the pressure.

The vital statistics of the J-70-B are interesting and important. Normal hp is 70 at 2000 rpm. It



Product view of Cummins J-70-B diesel engine.

piston dome. Displacement is 267 cubic inches, and it develops 198 ft. lbs. torque at 1300 rpm.

The records of operation as compiled by Junge's maintenance department in this pilot operation, shows a round number savings over gasoline operation of \$100 per month, or \$1200 per year, making it possible to pick up the capital investment of approximately \$2500 in the short time of two years. Costs of replacement of gasoline engines with this Cummins diesel in the field shops vary, of course, but Cummins engineers, estimated that it could be accomplished under most conditions for \$2500 which would include cost of the engine.

Junge Baking Co., is particularly fortunate in being able to convert to higher-priced diesels because it has previously developed cost methods which permit economical use of each truck up to 10 years. Projecting the present figures of the pilot operation, based on \$100 per month savings per unit, 100 units would result in a comparable savings of \$120,000 a year. Considering the Junge route on which No. 431 is now running, 4000 mi. per month, 48,000 mi. per year, or a half-million miles in 10 years, based on past performances of diesels, the savings would increase over the longer period, rather than decrease, compared with gasoline engines.

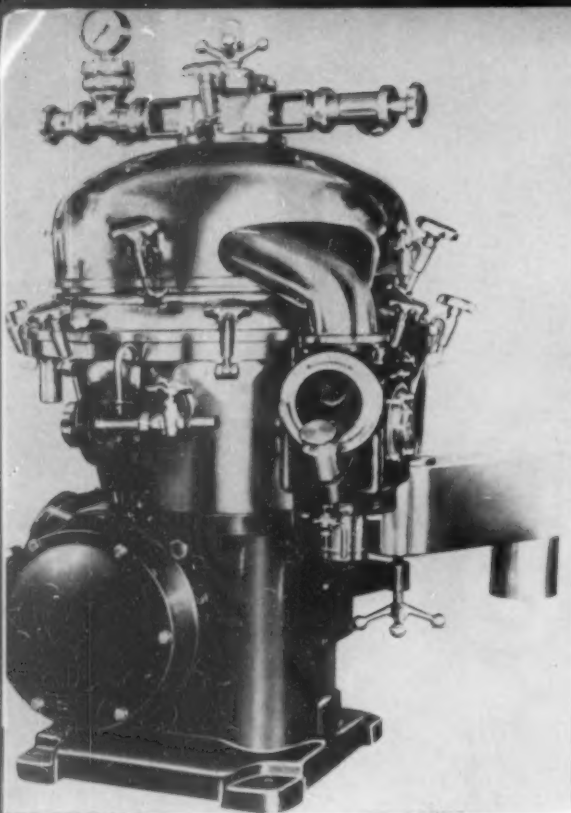
Robert Phillips and Robert Roebke, Cummins sales representatives, talk over operation of the installation with Driver Don Dicharry.



has a cylinder bore of $4\frac{1}{8}$ in. and a stroke of 5 in. Each cylinder has two $1\frac{1}{2}$ in. overhead valves. Lubrication is full pressure, all journals are induction hardened, bearings are the same as all other Cummins engines—steel-backed, copperlead type. Connecting rods are I-beam section alloy steel, pistons are light-weight aluminum alloy, cam ground with knurled skirt for maximum cylinder wall lubrication and the cylinder block takes a wet type liner. Exhaust valve seats use Stellite inserts.

Fuel pressure is adjustable from a minimum of 80 psi to a maximum of 260 psi. The camshaft controls the Cummins PT injector system and the fuel spray is introduced directly to the top of the





New De Laval PX separators have a capacity range of 200 to 6000 gph. They are self-opening and self-cleaning.

SELF-OPENING FEATURE ON NEW SEPARATORS

**New Model PX Separators by De Laval Eject Solids
While Unit is Running at Full Speed to Eliminate
Manual Bowl Cleaning Operation, Cut Expense**

CENTRIFUGAL separators have been used for many years at central power stations and aboard ships to purify main bearing lubricating oils. With the rising cost of distillate fuels, centrifugal separators have been called upon to also clean the heavy residuals substituted for distillates. This service is much more severe in that there is a heavy burden of contaminants that calls for high solids-handling capacity. To meet these requirements De Laval has introduced its line of model PX self-opening separators.

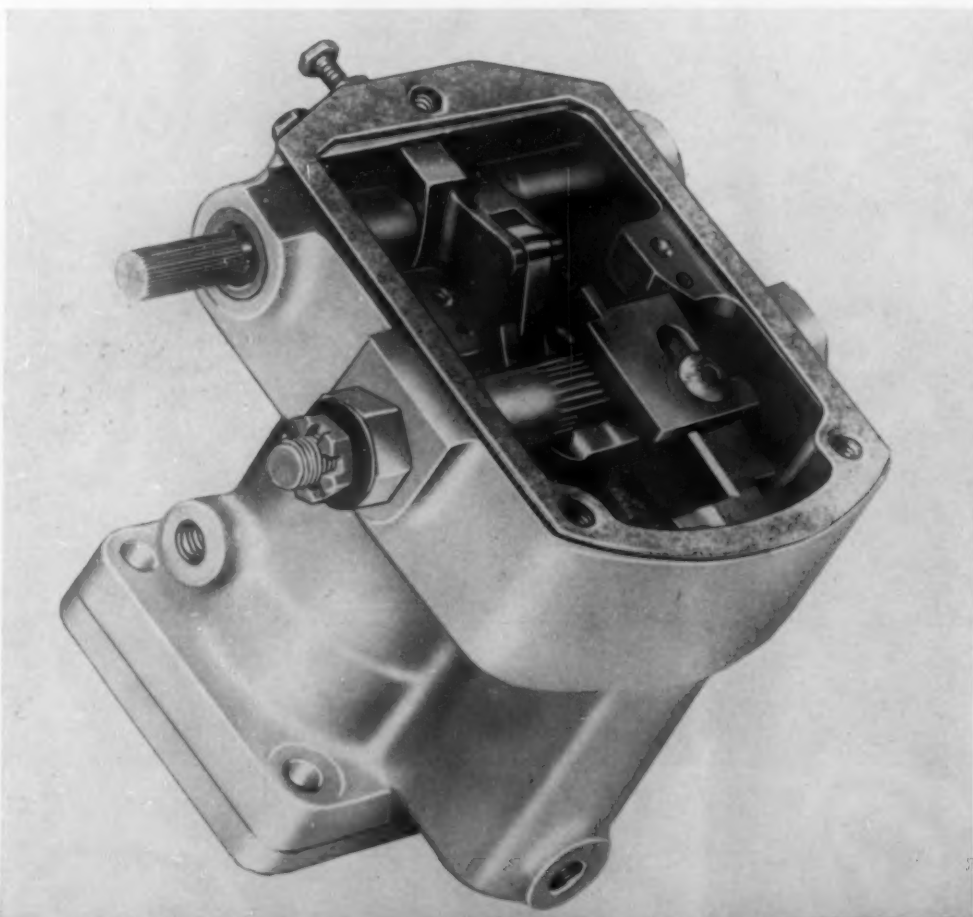
Outstanding feature of the new separator is its self-opening bowl. It allows solids to build up along the bowl wall just as they do in the conventional separator bowl. However, when the separated solids reach a predetermined amount, a series of apertures on the bowl wall are exposed and solids are ejected. This takes place while the bowl is running at full speed. The solids discharge cycle takes but a fraction of a minute and completely eliminates the time and labor expense of manual bowl cleaning. The disc bowl has been de-

signed to permit operation at lower bowl speeds than would usually be expected. Lower bowl speed cuts down on wear to moving parts and keeps maintenance and repair costs to a minimum. Several model sizes are available. The largest has a capacity range of 1000-6000 gph, operates at a bowl speed of 4500 rpm using 25-35 hp. It can hold 4.2 gal. of solids, discharge 90 gph of solids.

Conical Separating Discs

De Laval separators contain conical discs spaced a few tenths of a millimeter apart which divide the stream of liquid into a large number of very thin layers. Liquid enters the bowl through a central tube and is distributed between the discs. Heavy particles in the liquid move toward the periphery of the bowl under the action of centrifugal force. Instead of travelling the entire radius of the bowl, the particles quickly reach the underside of a disc and are separated. Furthermore, in a disc bowl the separated particles accumulate in a space outside the discs provided for that purpose.

GOVERNOR HAS EXTERNAL DROOP CONTROL



A NEW external speed droop adjustment that offers several control advantages has recently been made available for the type 4300 hydraulic governor built by the Pierce-Pickering Governor Co., at their Palisades Park, New Jersey plant. This 4300 governor introduced with a one and two foot-pound work capacity for either variable or constant speed service, has gained increasing application on high speed diesels, generator sets, engine driven compressors and marine engines. This governor can be mounted either vertically or horizontally because of its mounting flexibility.

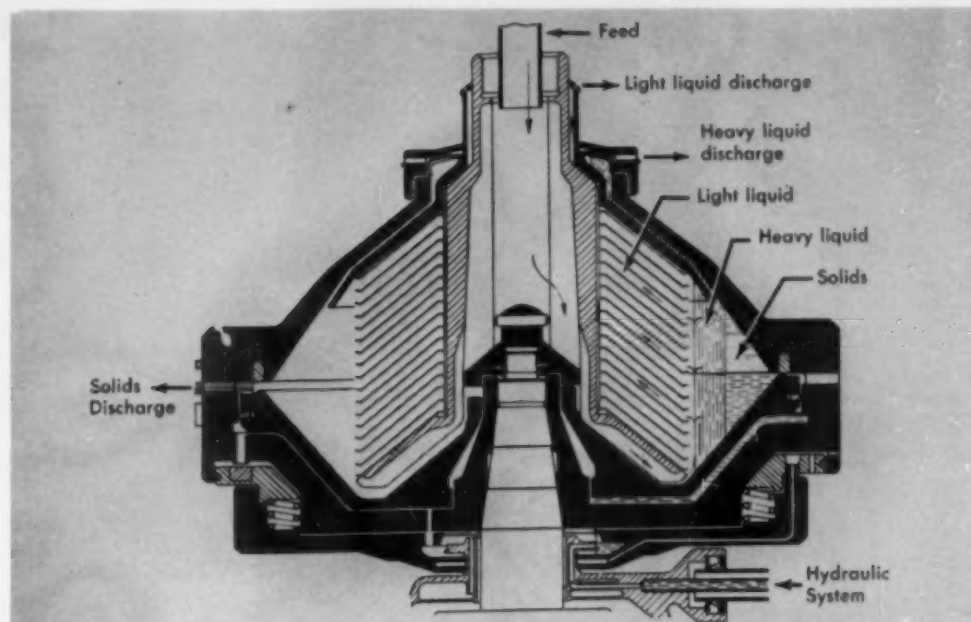
The external droop adjustment mechanism was developed to simplify the phasing of diesels in precise power military generator set service. With the new external droop adjustment, engines can be easily paralleled while in operation without removing the governor cover. The latter feature also enables the cover to be sealed following factory set adjustments which discourages improper

Type 4300 governor with the cover off showing the gear and rack mechanism for external droop control.

Feed liquid enters the PX bowl through a top feed inlet, flows to the bottom of the bowl and enters the disc stack through distribution holes. In the case of a three phase mixture (heavy liquid, light liquid, and dirt) the light phase is forced inward along the undersides of the discs and is discharged by a special paring device atop the bowl. The heavy phase is forced outward, travels upward along the outer edges of the discs and is discharged from a separate outlet. Solids also are forced out from the discs and collect in the conical shaped bowl wall. To keep the bowl in the closed position, water is fed into a series of slots on the underside of the bowl. The water builds up a hydraulic force of 200,000 lbs. and forces the sliding bowl bottom upwards, closing the bowl.

When enough solids have accumulated to warrant discharging, the bowl is opened by shutting off the feed material momentarily and draining the water that had held the bowl closed. The weight of the material in the bowl forces the sliding bowl bottom downwards exposing a series of slots on the periphery of the bowl. With the bowl still running at speed, centrifugal force causes the solids to discharge through the slots. The opening and closing operation can be performed manually, or, if optional controls are selected, the entire cycle can be made fully automatic.

The standard De Laval model PX separators are supplied with corrosion resistant bowl, cast aluminum bowl covers, cast iron sludge cover and manual bowl operating controls. A wide variety of optional equipment is available as follows: stain-



less steel bowl, bowl and sludge covers; completely automatic bowl operating controls; built-on feed pump; paring device for light phase or heavy phase discharge; liquid sight glasses; and hermetic inlet and outlet on larger size units.

PX machines are available in V-belt or direct drive. They are designed for feed material with a maximum specific gravity of 1.5. However, for liquids and solids with larger specific gravity, special bowl designs are available.

Specifications

	PX 207	PX 309	PX 213
Capacity range, gph	200-1500	400-3000	1000-6000
Bowl speed, rpm	6000	5600	4500
HP Requirements	10	20	30
Bowl sludge-holding space, gal.	1.1	1.9	4.2
Solids discharge, gph	20	40	90
Machine weight, lb., with motor	2700	3300	3600

field adjustment. Other advantages are: inventory reduction since this governor meets all prevailing droop governor specifications and enables the customer to add to his requirements, such as generating capacities, without changing governors. As seen in the photographs, the droop mechanism has been designed to provide a minimum amount of overhang, therefore it uses the least possible amount of engine space. This governor requires no additional space other than that required to mount a standard 4300 governor.

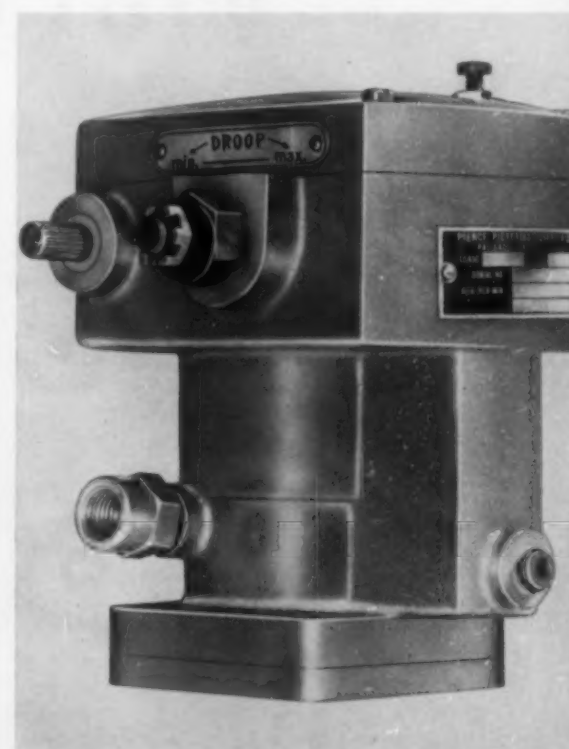
The new external droop adjustment mechanism is simple and unique as seen in the illustrations. Previously, to change droop it was necessary for the operator to remove the cover, loosen a screw and tap the droop adjustment block into a new position. Besides being time consuming and awkward, it was necessary for the operator to exercise care while tapping the block into position. Now on the external adjustable droop governor, Pierce-Pickering engineers have introduced a gear and rack mechanism for a positive and accurate adjustment. Two preloaded clutches prevent any relative motion in the adjusting mechanism except when required for setting droop. Changing droop setting is now easily accomplished by using two open end wrenches—one for holding the terminal shaft steady, and the other for rotating the large hexangular nut. This nut as seen in the photographs, is part of the gear which meshes with a

rack. Turning the hex moves the rack which is attached to the droop block, this accomplishes droop change. A "droop label" indicates the proper direction to turn the hex in order to attain minimum or maximum droop.

Droop adjustment acts directly on the droop block; there are no intermediate linkages and external parts affecting the flyball spring. This lack of external parts eliminates maintenance and control problems which are caused by dirt and maladjustment. All moving parts of the droop mechanism are made of hardened stainless or alloy steels, this adds to the corrosion resistance and troublefree operation of this governor. Less than 2 percent regulation, minimum response to load changes, and better than 1/4 of 1 percent steady state stability are control characteristics of this governor. This governor uses engine lubricating oil as the pressure medium at a minimum supply pressure of 5 psig. Normal optimum operating speed is 2400 rpm with a maximum of 3600 rpm upon application. High and low speed stops are provided and are readily accessible for operator adjustments of the governor.

The external adjustable droop governor is the first of a number of new developments which are underway at Pierce-Pickering Governor Co. since the acquisition earlier this year by Pierce Governor Co. of Anderson, Ind.

Hexangular nut on outside of governor provides easy adjustment within limits indicated on label.





NEW 2500 HP MAINLINE GE DIESEL LOCOMOTIVE

By ROBERT E. SCHULZ

ERIE, Pa.—A 2500 hp diesel-electric locomotive which combines high horsepower with operational simplicity is now being produced for high speed freight service by General Electric Company. Here at the Locomotive and Car Department in Erie, I met with company planning and engineering personnel to discuss the design and operation of the new unit and its motive power plant. Designated the model U25B, the locomotive is the largest and most powerful of the company's Universal line which was introduced in 1956 and reflects many engineering features stemming from GE's long association with the railroads. Briefly, the U25B measures 60 ft. 2 in. from coupler to coupler and is built on four axles to develop 625 hp per axle. Weight per axle is 65,000 lbs. and the total weight of the new mainliner when fully loaded is 130 tons. Prime source of power is a 16 cylinder turbocharged type F diesel built to GE's specifications by Cooper-Bessemer

Corp. and rated 2500 tractive hp at 1000 rpm. Seven years in total development, the U25B locomotive was designed for speed and economy in mainline freight service. Construction and operating features point to successful accomplishment of these objectives. A two unit prototype of the U25B has traveled over 150,000 miles in actual service on the Erie, Pennsylvania, Southern, Louisville and Nashville and Norfolk & Western railroads and this unit is now being operated on mid-western roads. Prior to this test program, a four-unit rolling laboratory was constructed in 1954 and it logged over 1,000,000 unit miles.

Here are the U25B's principal specifications:

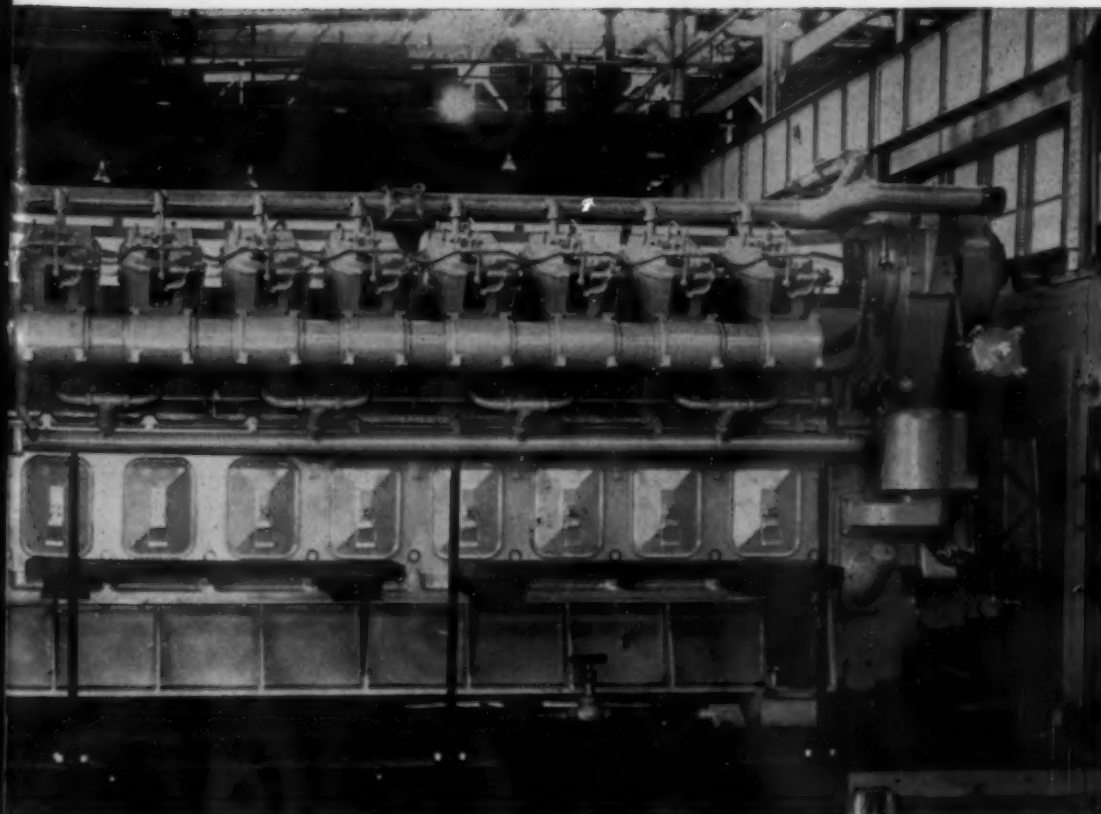
Continuous traction hp	2500 hp
Max. tractive effort at starting	81,000 lbs.
Max. locomotive speed with	
(74:18 ratio, 40" wheels)	65 mph



Here is the new General Electric high speed diesel U25B mainliner in freight service on a Eastern railroad. Unit maximum speed is 65 mph.

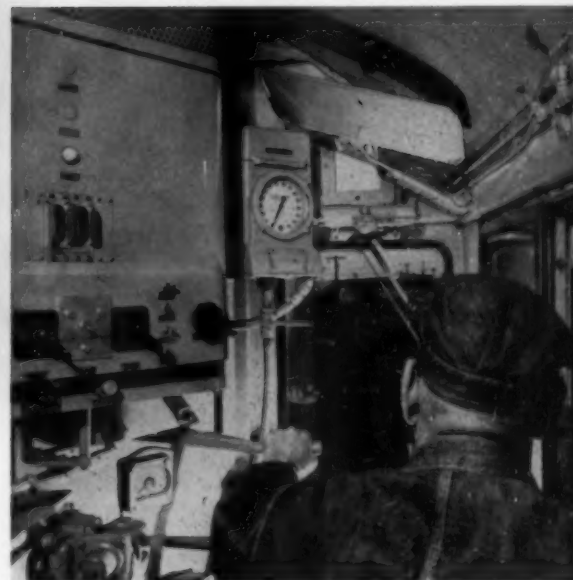
Locomotive weight (fully loaded)	260,000 lbs.
Weight per axle (fully loaded)	65,000 lbs.
Wheel arrangement	B-B
Length overall	60' 2"
Length between center plates	36' 2"
Height from rails	14' 7"
Fuel capacity	1,700 gal.
Lube oil system capacity	275 gal.
Cooling water system capacity	220 gal.
Sand	32 cu. ft.

Taking a look at the power plant first, the 16 cylinder engine is a modified version of the 6, 8 and 12 cylinder type F diesels used in more than 400 of the GE Universal line locomotives now in service here and overseas. It is a four-cycle, V-type diesel with cylinders of 9 in. bore and 10½ in. stroke. An Elliott high pressure turbocharger is used in conjunction with two large intake air aftercoolers to give the engine 2750 gross hp and 2500 net hp at 1000 rpm. Speed and load control is handled by a Woodward PGR electro-hydraulic type governor with built-in safety shutdown for low lube oil pressure. The engine drives a direct-connected General Electric traction generator which furnishes power to the four 625 hp axle mounted traction motors. The traction generator, model GT-598, is a direct-current, single anti-friction bearing, separately-excited machine and is equipped with windings to permit starting the engine by storage battery power. The four DC traction motors are the GE-752 type. Motors drive through single-reduction spur gearing. They are supported by the axles to which they are geared and by resilient nose suspensions on truck transoms.



Here is one of the prototypes of the FVDL diesel built to General Electric's specifications by the Cooper-Bessemer Corp. This engine is equipped with twin turbochargers, however the final test and production engines utilize a single, high pressure Elliott turbocharger. Drive is through a single bearing generator to four 625 hp traction motors.

Operator's compartment on the U25B showing the single lever, 16 point speed control.



In the six year engine development program conducted by General Electric, complete engineering and test facilities were established in Erie with work under the direction of J. C. "Jim" Rhoads, manager railroad locomotive engines. Meeting with Rhoads and W. W. "Bill" Peters, who heads up diesel advance design engineering, they pointed out that in the development of the FVDL diesel they have stressed extended service life on one hand, and simplified maintenance on the other. Considering this, let's look at the important features of this new engine.

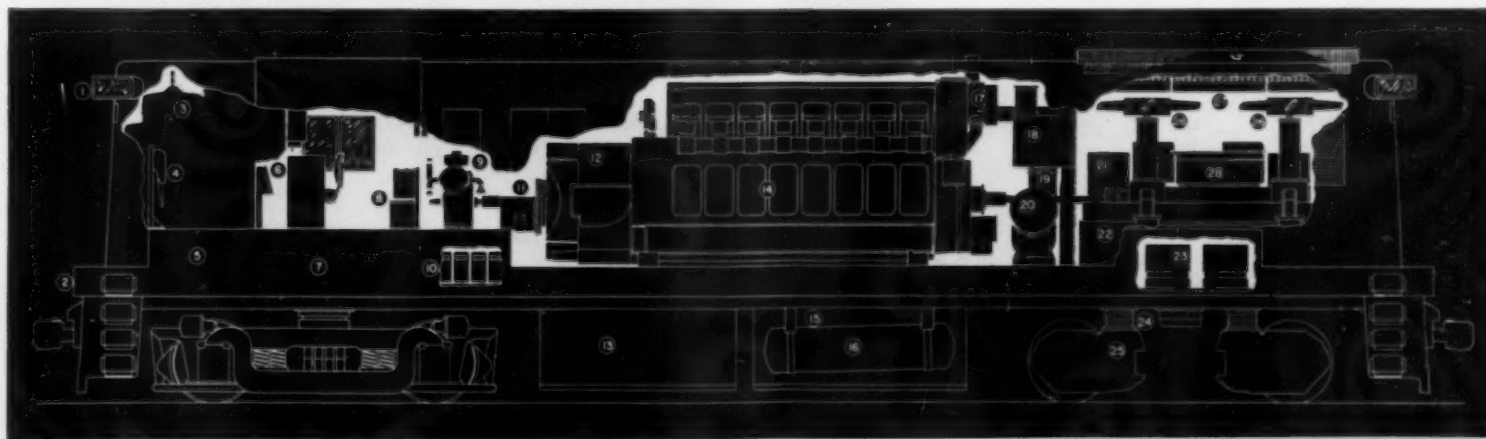
The head and outside cylinder wall of the engine are cast in one piece and since cylinder cooling water passages are continuous, water connection

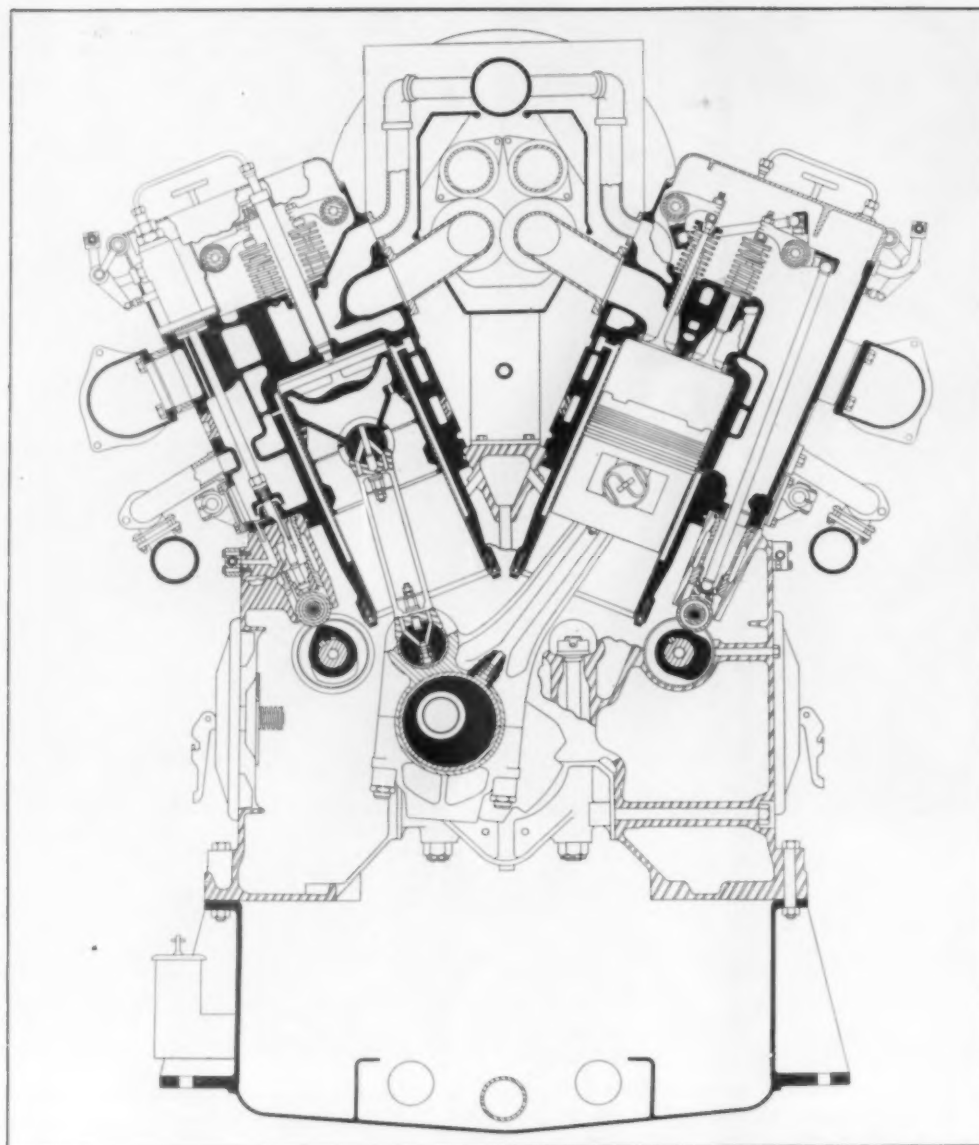
grommets are eliminated. With this unit design, the cylinder is held secure to the main frame by four bolts at the bottom, which eliminates the upper cylinder crab down bolts and gas seal joints. The cylinder when removed exposes the piston for inspection and rings can be readily replaced when required. The piston is of alloy cast iron with two abutment-type oil rings and four compression rings and it takes a $3\frac{1}{8}$ in. dia. bolted piston pin. This assembly rides in a thin wall ($\frac{3}{16}$ in.) chrome plated centrifugally cast iron liner chosen for its good wearing and rapid heat transfer qualities. Longitudinal flutes are cast into the cylinder housing to back up the liner and it is then pressed in from the bottom with an interference fit. The head is designed with transverse valve porting

with the dual intake and exhaust valves acting in parallel rather than in series to improve breathing characteristics. Bendix jerk type pumps are used and installed at the upper part of each cylinder as shown in the engine cross section to reduce length of high pressure lines to injectors. The cover can be removed for inspection purposes without disconnecting these fuel lines.

1. Headlights; 2. Multiple unit connector (if used); 3. Steam generator for train heat (if used); 4. Hand brake; 5. Control compartment (left side); 6. Operating controls; 7. Air brake equipment (right side); 8. Cab air duct and heater; 9. Air compressor; 10. Batteries (right side); 11. Auxiliary Generator (left side) Exciter (right side); 12. Traction Generator; 13. Fuel Tank; 14. Diesel engine; 15. Auxiliary fuel or water tank (if used); 16. Air reservoir (each side); 17. Turbosupercharger; 18. Engine cooling water tank; 19. Lube oil cooler; 20. Lube oil filter; 21. Dynamic braking equipment; 22. Equipment air cleaner; 23. Engine air filters (both sides); 24. Traction motor air duct; 25. Traction motor; 26. Radiator fans; 27. Radiator; 28. Equipment air blower.

The cross section also shows the articulated connecting rod design of the engine which has allowed GE to go an 8 in. tri-metal main bearing with $7\frac{1}{16}$ in. on the pin. The forged crankshaft is





Cross section of the Cooper-Bessemer 16 cylinder diesel. Note position of Bendix pumps, the unit cylinder design, the thin liner and articulated rod, as well as exhaust manifold arrangement

nitrided and the frame itself is cast of Meehanite iron. Quick acting crankcase covers of stamped metal are used at each position and these covers also act as explosion relief doors.

The mainfolding of the FVDL engine is interesting from an overall design basis. The cross section shows the location of the intake manifolds outside the Vee and they are sectionalized for simplified maintenance. The exhaust manifold, within the Vee, is made up of eight individual pipes, one for each two cylinders and these carry the gases directly to the turbocharger inlet box. The exhaust manifold is built of stainless steel by Hanlon & Wilson and is the result of more than three years of design and engineering research in cooperation with General Electric. Light in weight and designed for long service, the manifold with its contour forming provides for an even flow of exhaust gases and reduction of turbulence of these gases. The exhaust manifold is flexible and vibration and expansion requirements are adequately covered by slip joint construction. Each slip joint is encased in a bellows which insures gas tight operation. The Elliott turbocharger used is a model H-588 with a pressure ratio of about $2\frac{1}{2}$ to 1.

Another feature of the installation is the dry radi-

ator system incorporated to maintain engine temperature during either winter or summer operation at 170 F. In the system, engine cooling water circulates in the engine and a tank inside the engine hood until it reaches 170 F. At that point a thermostatically controlled bypass valve working in conjunction with a pressure operated, fast acting poppet valve opens allowing a surge of water to pass through to the cooling radiator. Under most conditions the thermostats then modulate the flow to the radiators. Under limiting conditions, the poppet valve closes, so the system works on a batch cooling basis, rather than permitting small amounts of water to enter the radiator section. This is necessary particularly in cold weather operation to prevent freezing since the system is designed and has been tested for operation without antifreeze in temperatures to -40 F. GE experience indicates that a 2-3 degree variation in engine temperature can be expected under normal operating conditions and not more than plus or minus 10 degrees in all service conditions.

Since dirt and increased maintenance costs are closely linked, General Electric engineers have designed a dual air filtration system into the U25B. This, in effect, provides two-fold conditioning of the air entering the engine. All locomotive venti-

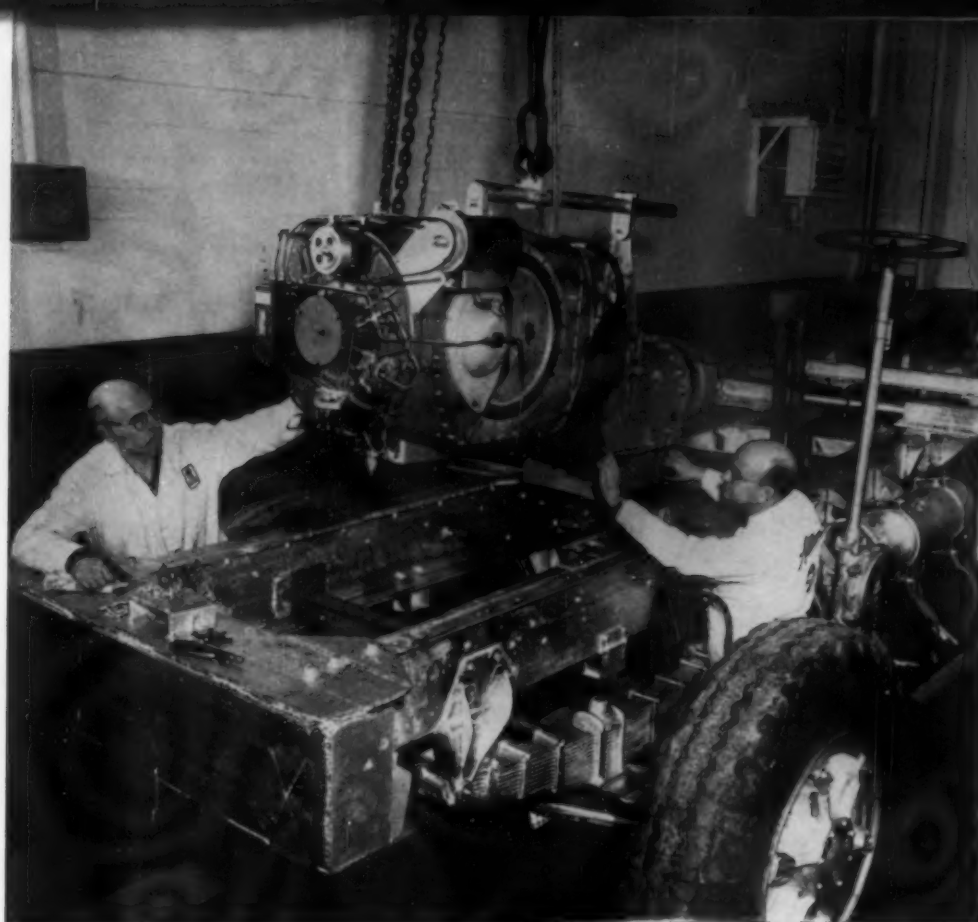
lating air except that for cooling radiators and braking resistors passes through an axial flow blower and a static type Aeratee Industries self-purging air cleaner which removes, according to GE, substantially 100 per cent of the particles above 8 microns and a large proportion of the smaller particles. The cleaned air travels through a duct formed by the space between the platform center sills to the engine, the operating cab and the compartments housing electrical equipment. The air to the engine is then further filtered in Air-Maze panel bath units. With the positive pressure in the various compartments, Rhoads stated that the possibility of air with attendant dirt entering openings in the cab structure is eliminated.

The diesel engine is equipped with a full pressure lubricating oil system using a gear type pump. This pump provides a continuous flow of oil to the piston cooling chamber by drilled passages in the crankshaft and connecting rods. A Briggs eight element full flow filter is used with a Yates-American cooler and Nugent built-in strainer.

A 16-position throttle control on the U25B regulates the engine output through the Woodward governor and controls the proper application of power to the four traction motors. It is arranged to operate in multiple with locomotives having 8-notch throttles. The operating cab, located between the power-plant hood and front (short) equipment hood provides visibility for operating in either direction. The control station is at the right side with the front equipment hood leading and the main propulsion control equipment is located on the left side of the locomotive beneath the operating cab. This compartment, maintained under positive pressure as mentioned before to keep out dirt and water, contains contactors, reverser, braking switch, resistors, and auxiliary electrical devices. All air brake devices and air operated equipment, battery trays and panel bath filter assemblies are located in easily accessible compartments along the sides of the locomotive. The engine hood encloses the diesel, the traction generator and the air compressor. Full height, side access doors extend the length of the engine and generator on both sides of the hood. Doors in the roof provide access to engine cylinders.

Principal Equipment Serving FVDL-16T Diesel

Traction generator & Motors	General Electric
Governor	Woodward
Fuel system	Bendix-Scintilla
Turbocharger	Elliott
Lube oil filter	Briggs
Lube oil strainer	Nugent
Lube oil cooler	Yates American
Fuel oil filters	CFC Fullflo
Panel bath air filters	Air-Maze
Engine lube pump	Roper
Engine fuel pump	Tuthill
Thermostatic controls	Detroit Controls
Radiator	Perflex
Exhaust manifold	Hanlon & Wilson
Flexible hose couplings	Aeroquip



Mounting the Allison 225 hp gas turbine engine on ore haulage truck chassis for use at The International Nickel Co. of Canada, Ltd., open pit mine in the Sudbury District of Ontario. This marks the first time an automotive gas turbine engine has been subjected to the rugged requirements of ore hauling.

GAS TURBINE ENGINE FOR ORE HAULING

AN Allison regenerative gas turbine engine is undergoing tests in a truck used for hauling ore at the International Nickel Co., of Canada, Ltd., open pit mine in the Sudbury district of Ontario. Inco states that the installation marks the first time an automotive gas turbine has been subjected to the rugged demands of ore hauling.

The turbine engine used in the Inco ore truck is the Allison GMT-305 Whirlfire. The 225 hp multi-fuel unit is the latest in the series of General Motors research turbine prime movers. The installation was completed by Allison early this year and the unit went into service in February.

International Nickel which has undertaken this field testing of the turbine engine, has been long interested in potential of the gas turbine for commercial use and Inco research personnel have helped develop heat-resistant nickel alloys which made up a major part of turbine components. The GMT-305 turbine was installed in a truck which hauls 32-ton loads of ore from the pit floor up two miles of winding, 8 per cent grade roads to a crushing plant located 1000 feet above the bottom of the pit.

The Allison gas turbine will undergo a rugged test in the extreme climate in the Sudbury district

where winter temperatures dip well below zero. The GMT-305 has been started, after extended cold soaking, at -45 degrees in about 30 seconds and can be started even at temperatures as low as -65 degrees. Low oil consumption and the multi-fuel capabilities of the turbine are expected to make the unit economical to operate. Also, since optimum fuel economy is realized at full power, Inco officials believe the turbine will perform particularly well at this heavy duty application.

Allison's GMT-305 gas turbine is the development of General Motors research in the automotive turbine field. The first unit in the series, the GT-300 was installed in a highway bus several years ago. Further developments, especially in regeneration, brought later models with greater fuel economy and better operating characteristics. GM turned over commercial development of its automotive turbine to the Allison division in 1959. The Inco ore hauling truck installation was one of the first industrial applications of this unit.

The GMT-305 turbine engine used in the ore truck is a two shaft unit weighing 750 lbs. Designed for an inlet temperature of 1650 degrees F, the first stage turbine turns the radial flow compressor at 33,000 rpm through the connecting shaft. The second stage or power turbine, behind the first turbine but mechanically separate, drives the output shaft through a single stage helical reduction gear. The power turbine develops full power at 24,000 rpm, which is reduced to 3500 rpm at the output flange. A speed limiting governor permits the output shaft to turn as high as 4,500 rpm to take advantage of the flat characteristics of the gas turbine horsepower curve.

The turbine's 225 hp rating is gained at output shaft speed of 3500 rpm. The ratio of stall to full power torque is about 2.25:1.

Approximately 30 pounds of nickel nearly one-sixth of total engine weight, is used in the alloys of the GMT-305 prototype. Nickel-containing materials are used in the hot end components such as the turbine blades, turbine wheels, combustion chambers and nozzle vanes. The drum-type regenerator, which operates at lower temperatures also relies heavily on nickel-containing alloys.



In operation at the open pit mine in the Sudbury District. The truck is capable of hauling a load of 32 tons of ore.



TOWBOATS SLATED FOR COAL, PETROLEUM TRADE

***Albert F. Holden* and *Franklin Pierce* Are Dravo 3200 HP Vessels; Will Operate on Ohio River and Between Gulf Ports and Pittsburgh Area; Power Supplied by Pair of GM 16-567C Engines**

A PAIR of twin towboats, one to be used for towing petroleum products and the other for operations in the Ohio River coal trade, were delivered recently by Dravo Corp., Pittsburgh. The 3200 hp vessels are of Dravo stock design.

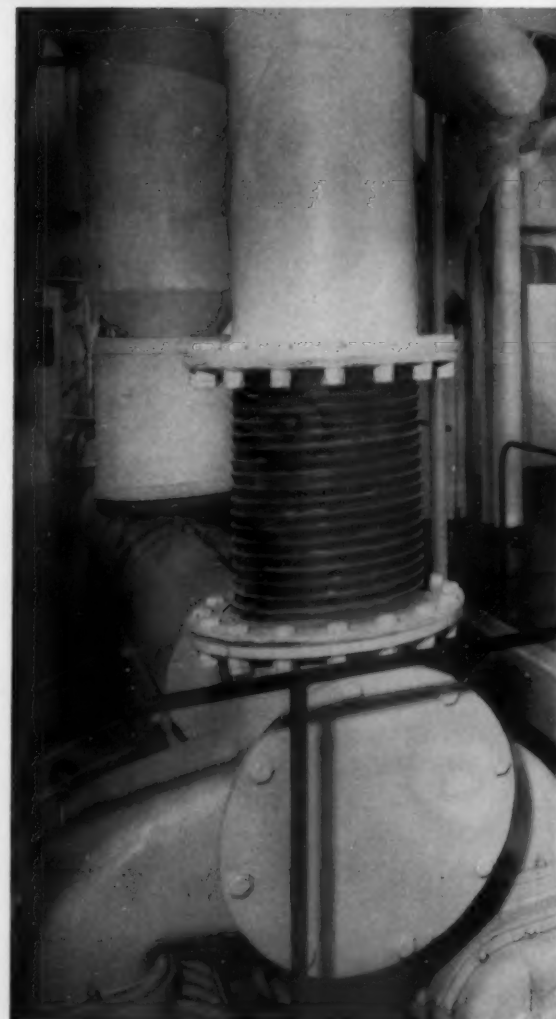
One of the vessels was christened the *Albert F. Holden* and was built for the Island Creek Fuel and Transportation Corp., a subsidiary of the Island Creek Coal Co., of Huntington, W. Va. The other vessel is the *Franklin Pierce*, which went into service for the Thomas Petroleum Transit, Inc., of Butler, Pa. The *Holden*, named for one of the founders of Island Creek Coal Co., will operate on the Ohio between Cincinnati, Ohio and the Pittsburgh area. Island Creek Fuel and Transportation has been engaged in river transportation of coal for 59 years. During this period 48 million tons of coal have been loaded into barges at its Huntington and Kenova, W. Va., terminals. Up-river activity has expanded rapidly in recent years due to greater demand for high-grade metallurgical coals.

The *Franklin Pierce* was named for F. P. Thomas, president of Thomas Petroleum Transit. The *Pierce* is scheduled for high speed towing of petroleum products between Gulf coast ports and Pittsburgh area terminals.

Both vessels, being of stock design, are similar except for minor variations in equipment. The boats are 148 ft. long, have a 34 ft. molded beam, 10 ft. 6 in. depth at the side (molded to main deck) and operating draft of 8 ft.

Propulsion power is furnished by a pair of General Motors model 16-567C diesel engines, each rated 1600 hp at a propeller speed of 212 rpm. These engines, with bore and stroke of 8½x10 in., each drive four-bladed 8 ft. 6 in. diameter propellers through Falk model 21MB reverse and reduction gears. Engines and reverse-reduction gears are mounted amidships integrally in the hull.

The propellers are of high tensile steel; their



◆ The *Albert F. Holden* during trial runs on the Ohio. The vessel will operate in the coal trade between Cincinnati and the Pittsburgh area. Power is supplied by a pair of GM model 16-567C diesel engines rated 1600 hp each.

At the controls of the *Pierce* is Franklin Pierce Thomas for whom the boat is named. Pilothouse is equipped with all modern navigation aids. All engine functions except starting are controlled from pilothouse.

pitch, area and form were designed by Dravo for use with the Dravo Kort nozzle in heavy duty towing operations. Six streamlined, balanced rudders control the vessels' course. One is located aft of each propeller for steering ahead and two are forward of each propeller for flanking. The hydraulic steering system is controlled from the pilothouse console by means of steering rods running to the steering compartment. The rudders remain at the same angle as the levers in the pilothouse, giving the pilot a constant indication of rudder positions. Just forward of each propeller is a single-armed steel strut which supports the propeller shaft.

Fuel oil tanks are located forward and aft, and to either side of the machinery space. Wash water

Engine room of the *Albert F. Holden* showing the pair of GM 16-567C diesel engines. Each engine turns a four-bladed, 8 ft. 6 in. propeller through Falk reverse and reduction gears.



is stored in a forepeak tank, drinking water in the forward hold. Both hull and superstructure of the vessels are of welded steel construction.

The superstructure includes the main deckhouse, upper deckhouse and lounge facilities for a crew of 10, galley, messroom, machinery space, steering gear compartment and deck stores space. The upper deckhouse contains quarters and lounge for nine persons and will house officers and guests. The pilothouse, atop the forward end of the deckhouse, contains controls for all towboat operations except engine starting.

Electric power for auxiliary service is provided by two GM diesel-generator sets of 75 kw capacity. These generators supply 440 volt, three phase, 60 cycle alternating current.

The vessels have two steering gear systems, one for flanking and one for steering ahead. Steering engines are located above deck level for easier access. Each system consists of a double-ended hy-

draulic ram, steering control valves and control and followup mechanism. Both rams are connected to a common hydraulic accumulator. A second pump cuts in automatically when pressure falls to approx. 75 psi below operating level.

Engine driven jacket water pumps circulate clean water through the engine, lube oil coolers and hull skin cooler. Separate skin coolers are fitted for the auxiliary engines.

Principal Equipment *Holden and Pierce*

Main Engines	GM Cleveland
Reverse and reduction gears	Falk
Lube oil filters	Briggs
Lube oil strainers	Cuno
Air starting compressors	Gardner-Denver
Propellers	Avondale
Switchboard	Lake Shore
Auxiliary generating sets	GM Detroit
Motors	Westinghouse

The *Franklin Pierce*, sister ship to the *Holden* underway on the Ohio near Pittsburgh with a petroleum tow. She will operate on the Mississippi and Gulf Intracoastal canal between Pittsburgh and Houston, Tex., areas.



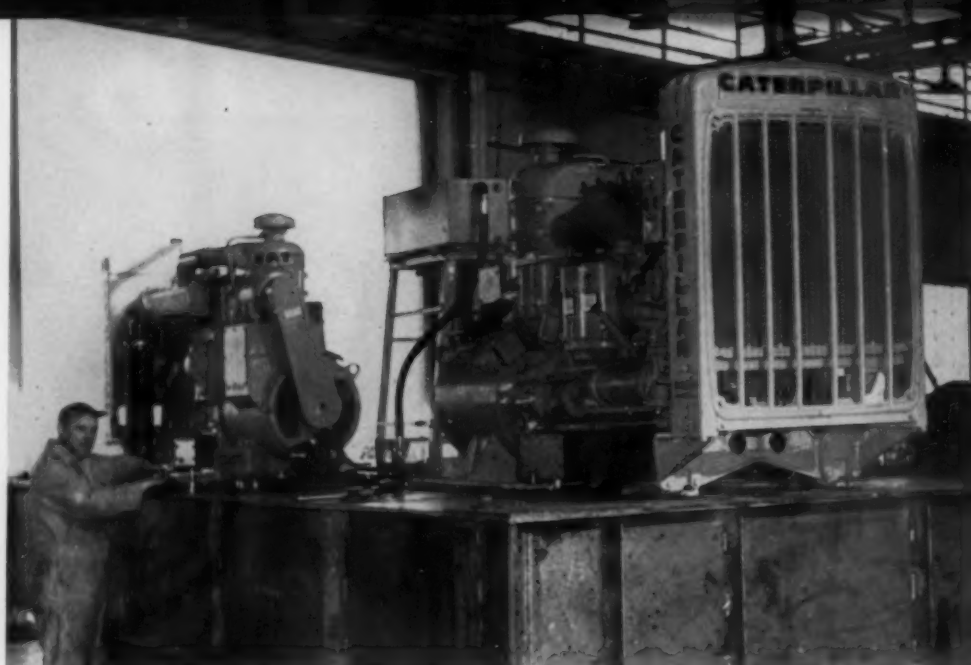
DIESELS KEEP FOODS COOL TO ALASKA

SINCE Alaska has become a state increased demands have been placed on industry to meet the needs of its expanding populations. Of primary importance in keeping up with the population growth is an uninterrupted food supply. One rather recent development in the industry is the advent of frozen foods.

A basic problem in the frozen food industry is keeping the food frozen during transportation, often over long distances before it finally reaches the consumer. This was a major problem in expanding the industry to the Alaska market.

The transportation problem was tackled by Puget Alaska Van Lines, serving the West Coast to Alaska. They decided the most economical way to carry the food from Seattle to Alaska was by barge, employing a tug boat for towing. The next obstacle was to find ways to keep foods frozen during the 12 to 14 day trip to the Alaskan dock. It was decided food would be loaded in 24 ft. van containers at the various vendor's plants and carried by truck to the docks. To expedite cargo transportation, the fully loaded vans would be placed on the barge, thus eliminating rehandling. A section of a 272 ft. barge was redesigned to accommodate about 75 refrigerated van containers

42



View of Cat electric sets and base during construction at Peterson Marine. Engine is mounted in container of same size as regular vans. Power from the sets is used to drive refrigeration motors in the frozen foods van on the barge.

per trip. Each container has its own refrigeration unit powered by a 10 hp electric motor. Then the problem was to provide an economical, dependable source of power to keep the motors in each van running during the long voyage.

Peterson Marine, a division of Peterson Tractor Co., San Leandro, Calif. was assigned to build power units to satisfy the stated requirements. Peterson's marine engine division developed an automatically controlled diesel electric setup with adequate power to do the job. Three Caterpillar electric sets driven by Cat. D326 diesel engines and rated 100 kw each make up the complete power package for a typical installation. The D326 engine is Caterpillar's six cylinder, four cycle engine with bore and stroke of $5\frac{1}{4} \times 6\frac{1}{2}$ in. and rated 137 hp at 1800 rpm.

◀ Hoisted electric set van ready to go into operating position on the barge. Note terminals for power cables on near end of the van.

Loaded barge is readied to start its trip from Seattle, to Seward, Alaska. Barge is 272 ft. x 68 ft. x 19 ft., can carry 300 vans 24 ft. long or 6000 tons. About one-fourth of the vans on a normal trip are refrigerated. Mikki class 115 ft. tugboat, owned and operated by Puget Sound Tug and Barge Co., is powered by 1800 hp. Fairbanks-Morse diesel engine.

One diesel electric unit is used at the Alaska dock to power the van reefers before they are picked up for distribution. The other two sets are installed as an entirely automatic team on the ocean-going barge to feed power to the 10 hp electric motors in each van's refrigerating units. Automatic controls operate both engines whenever the demand exceeds 80 percent of a single engine rating. Should one engine fail for any reason, the other engine automatically takes over, thereby maintaining constant operation. When an engine is on standby, electric heating units in the cooling system keep it at operating temperature to facilitate starting without loss in operating time. Normal changeover from one electric set to the other takes place automatically every 24 hours. A built-in radio transmitter and signal lights on the diesel vans on the barge advise the tugboat personnel at engine changes and give them warning in case of power failure.

The entire two-unit installation on the barge is completely enclosed in an insulated steel housing. This unit has a fuel tank base with a capacity of 2600 gals., adequate to operate both diesels for the complete trip. The housing is the same overall size as the van, permitting use of the special hoisting rig which had already been built to match dimensions of the food vans.





The *Volador III* during trials at Houston. The all-aluminum crewboat was built by Breaux Baycraft, Inc., Loreauville, La., and will be used at Maracaibo, Venezuela as a personnel carrier. Boat is 55 ft. long, can travel at average 38 mph, with normal load.

V-12 DIESELS IN FAST, NEW CREWBOAT

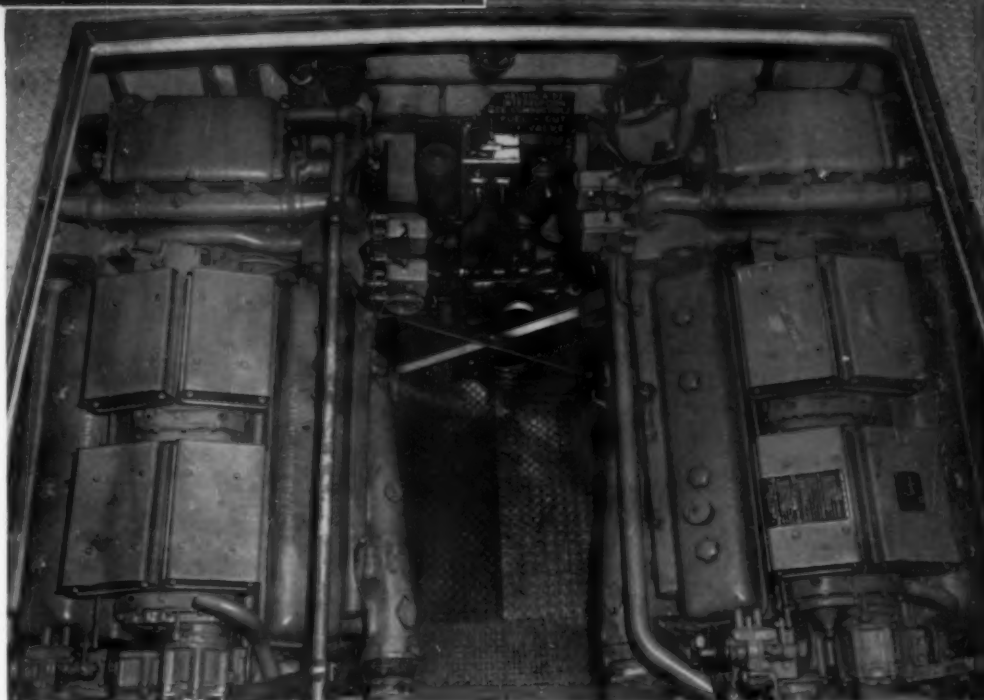
A NEW crewboat slated for service in the Lake Maracaibo, Venezuela, oil fields was shown to members of the press and customers of Stewart & Stevenson Services, Inc., at the Houston (Tex.) Yacht Club recently. The big, fast, all-aluminum craft was built by Breaux Baycraft, Inc., Loreauville, La., and is now in use by Nadim Dao Co., of Maracaibo as a personnel carrier for major oil companies on Lake Maracaibo.

Called the *Volador III*, the new boat is powered by a matched pair of General Motors 12V-71 diesel engines with a total of over 1000 hp. This was one of the earliest installations of these engines in high speed, high performance vessels built to serve the oil and gas industry.

The 55 ft. craft is capable of 38 mph average speed with normal load of fuel, water, passengers and other cargo. The *Volador III* has a molded beam of 13 ft. 4 in., molded depth of 7 ft. and loaded draft of 3 ft. 2 in. Passenger capacity is 26 persons, carried in a cabin which extends about two-thirds the length of the boat aft of the pilothouse.

The GM 12V-71 diesel engines are installed under the afterdeck where they are easily accessible for servicing through a large removable hatch. Cargo handled by the boat is carried in the open deck area behind the passenger cabin.

The matched pair of engines are each rated 504 bhp at 2300 rpm. The engines, one of a new line introduced by GM last year, are two cycle, vee-type, 12 cylinder models with 4½ x 5 in. bore and stroke for a piston displacement of 815.2 cu. in. Dry weight of the marine engine is 4050 lbs. Each is equipped with Allison 1½:1 reverse and reduc-



tion gear with special modifications by Stewart & Stevenson to provide a lightweight gear package for the installation.

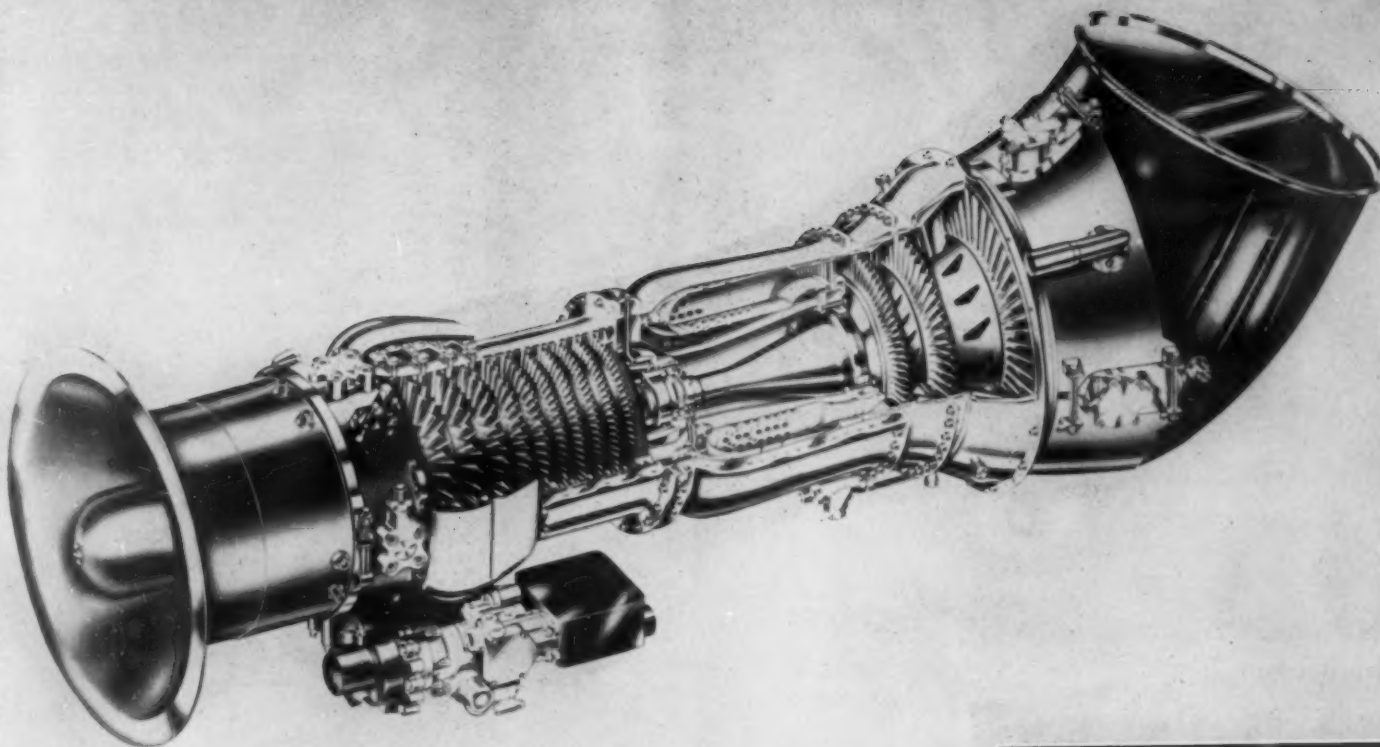
Each engine drives a Michigan 28 x 32 in Dynojet propeller with the propellers rotating outward at the top. The engines are equipped with Penn safety shutdown and alarm controls for high jacket water temperature and low lube oil pressure which ring an alarm in the pilothouse should either condition occur. The engine cooling system utilizes raw water through a Perry filtering system and through a Harrison heat exchanger. Other accessories include 32 volt Delco-Remy starting motors, Morse mechanical one lever controls for each engine and Leece-Neville alternators belt-driven from the engine crankshaft to supply such electrical needs of the crewboat as lighting, radio and charge for the starting batteries. Air for the engine room compartment is supplied through inlet vents mounted at the after corners of the

passenger cabin and on the deck sides above the engine compartment.

The *Volador III* weighs 34,000 lbs. complete with normal load including fuel, water and passengers. Fuel capacity is 400 gals., while fresh water capacity is 30 gals.

The bottom of the vessel is fabricated from ¾ in. aluminum; sides are of ¼ in. aluminum and the decks are of ¼ in. aluminum. Longitudinal members, struts and similar components are of ¾ x 2 x 4 in. "T" bar construction. The fabrication provides a strong bottom and sides for long life and the design has been carefully planned to permit the most rugged construction and still allow for high performance and light weight.

The *Volador III* was clocked at a top speed of 39.8 mph in trials and averaged 38 mph over several miles when fully loaded.



GENERAL ELECTRIC'S NEW 900 HP GAS TURBINE

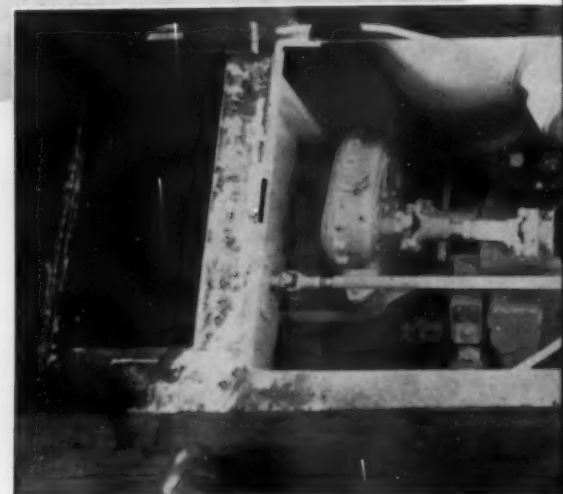
**Model 720/722 Engine is Industrial Adaptation of GE's
T58 Turboshaft Unit; Builders See Applications
In Landing Craft, Oil Well Fracturing Units,
High Speed Natural Gas Compressors; Engine
Weighs 300 Lbs., Without Reduction Gear,
Has Maximum 1050 SHP Rating**

AMONG the more recent developments in light-weight gas turbines is the Model 720/722 engine now being built by General Electric Co. at its Lynn, Massachusetts plant for a range of industrial and marine power applications. Designated model 720 for liquid fuel burning and 722 for natural gas operation, the new turbine engine has a maximum horsepower rating at 60° F sea level of 1050 shp. Its maximum continuous rating is 900 shp at 19,500 output shaft rpm with a thermal efficiency of 22 percent. With running accessories, but not including reduction gearing, the engine weighs 300 lbs. Various reduction gears are available with weights ranging from 75 to 1800 pounds.

The model 720/722 is an industrial adaptation of the General Electric T58 turboshaft engine originally developed for the U.S. Navy and incorporates many features which have led to its announced application for powering amphibious landing

craft, mobile oil well fracturing pumps and high speed natural gas compressors. Two 2000 hour endurance tests have been completed. These were cyclic endurance tests in which each engine achieved 4000 starts, 12,000 accelerations, and 22,000 power changes at test completion. One other engine has logged more than 1000 hours without overhaul in accelerated operation.

The mechanical design of the engine can be seen from the cutaway drawing illustrated. It is an all axial-flow design having 10 stages of compression which boosts the pressure to more than 8 atmospheres. The air leaving the compressor passes through a diffuser section to an annular combustion chamber into which fuel is introduced through two sets of eight fuel nozzles, each mounted around the dome of the combustion liner. Ignition is accomplished by two plugs which operate only during the starting cycle.



The resulting hot gases are first expanded through a two-stage turbine which drives the compressor through a torque tube down the center of the engine. The gases are then further expanded through a third turbine wheel which provides the power to the output shaft. There is no mechanical connection between the so-called gas generator rotor, consisting of the compressor, the first two turbine wheels and the connecting shaft, and the power output turbine with its shaft. It is the free power turbine principle which gives 2.5 to 1 torque multiplication, since the gas coupling between the two rotors is essentially a built-in torque converter.

Engine accessories, consisting of the fuel and lube pumps, main fuel control and governors and tachometer-generators, are mounted under the forward section of the engine and are driven through a radial quill shaft in the forward frame. Engine starting can be accomplished by electric, hydraulic or compressed air power by means of a suitable starting motor mounted on the pad in the eye of the compressor. The starting cycle requires only 20 seconds during warm weather and less than 50 seconds in temperatures as low as -65° F.

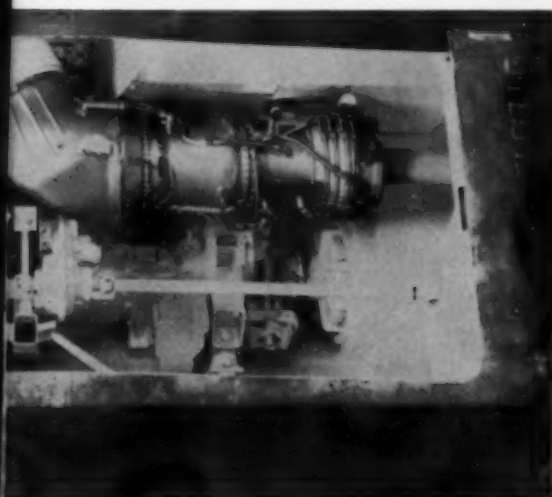
Mechanical design of the GE 720/722 gas turbine engine can be seen in this cutaway drawing. All axial flow, it has ten stages of compression.

Specifications*

Maximum continuous shaft horsepower	900
Fuel consumption at maximum continuous power Model 720/722 (BTU's per horsepower/hour)	11,500
Thermal efficiency (per cent)	22
Engine weight with running accessories (lb.)	300**
Overall length with gearing (in.)	85
Height with gearing (in.)	40
Pressure ratio	8.3:1
Compressor airflow (lb/sec)	12.4
Power Turbine speed (RPM)	19,500
Output shaft speed (RPM)	19,500
Reduction gear output shaft speed (RPM)	2,800
Turbine inlet temperature (degrees F)	1,530

*Sea level, 60° F

**Does not include reduction gear.



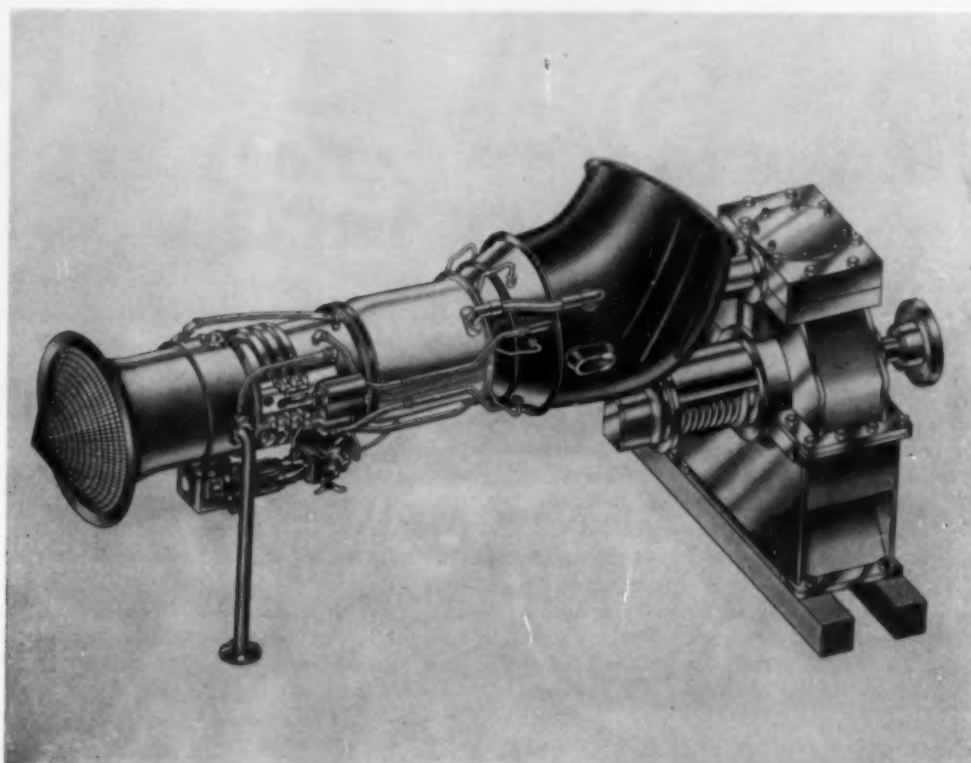
Machinery arrangement in amphibious vehicle, LVT-10 being converted from gasoline to 720 turbine power by Jered Industries.

Confining our interest to industrial and marine applications, the model 722 is one of two small gas turbine engines which Trunkline Gas Co. will evaluate in main line pumping service this year at its Cypress compressor station on the outskirts of Houston. The engine, driving a DeLaval high speed centrifugal gas compressor, will be mounted on a skid and installed on a concrete slab forming a complete self-contained unit. The control system, developed by Foxboro, provides variable gas generator speed selection with fixed maximum selected speed, automatic starting and protection against overspeed and overtemperature. The turbine-compressor will operate on a steady-state type of duty cycle 24 hrs./day and a test of 12 months duration is planned. The Halliburton Oil Well Cementing Co. received a model 720 turbine package with fracturing reduction gear in June. The engine will undergo a period test cell operation before being installed on a Halliburton Oil well fracturing truck for evaluation in field service.

The engines will power triplex pumps delivering up to 1,100 gpm of oil and sand slurry at pressures as high as 8000 psi.

One of the important installations also to be made this year is in a tracked vehicle used by the Marine Corps during their amphibious operations. In addition to serving as a landing craft, it is also designed to serve on land as a gun carrier, cargo carrier and bulldozer. Conversion of one of these vehicles from gasoline engine to turbine power is now underway at Jered Industries, Inc. in Detroit. Designated the LVTPX-10, the vehicle will be powered with a model 720 turbine in conjunction with a Jered transmission.

The installation as illustrated has the engine mounted above and parallel to the main transmission which enables the engine compartment bulkhead to be moved aft by five feet, thus enlarging the cargo volume by a total of 210 cu. ft. The 6000 rpm shaft from the engine reduction gear is dropped through an additional gear train to a parallel shaft below the engine. This shaft drives into the main transmission through a set of bevel gears at approximately 5500 rpm.



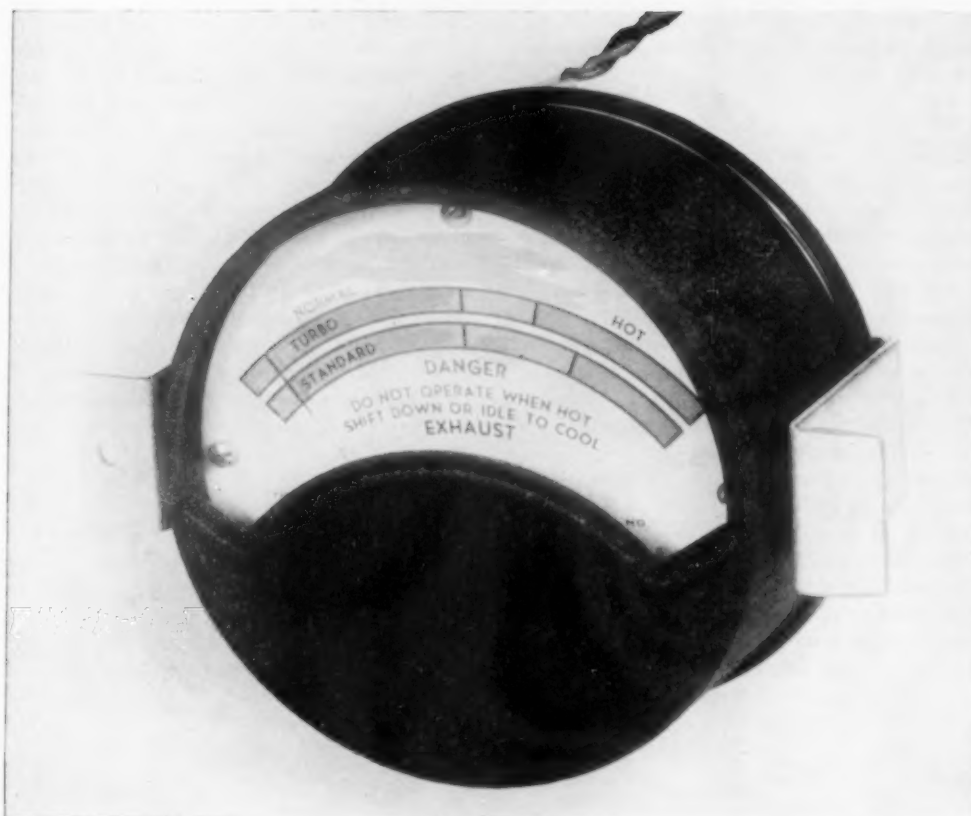
GE 720 turbine and gear which will power triplex pump on Halliburton mobile fracturing unit weighs 1200 lbs. Delivery is 1,100 gpm of oil and sand slurry at up to 8000 psi.

Proposed Trunkline Gas Co. installation of model 722 turbine and DeLaval centrifugal compressor.

The 720 GE turbine is also being used as a power plant in marine craft—a 24 ft. experimental high-speed hydrofoil which began sea trials last summer. In addition, the engine has been selected as the docking or maneuvering engine for the recently-announced 80-ton hydrofoil being built for the Maritime Administration. The experimental hydrofoil is being developed for the Mechanics Branch of the Office of Naval Research by Grumman Aircraft and its affiliate, Dynamic Developments, of Babylon, Long Island. In addition to gas turbine power, it is a test bed for "super-cavitating" hydrofoils which differ from conventional foils in that a "vapor cavity" is created on the upper surface of the foils, resulting in greatly multiplied speed capabilities. Top speeds in excess of 60 knots have been achieved.

In addition to the above, General Electric application engineers are projecting the use of the 720 gas turbine for electric power generation and for use in large off-highway vehicles. The off-highway application was covered in a paper "Gas Turbine Power for Earthmoving Vehicles" presented at the SAE 11th Annual Earthmoving Industry Conference held recently in Peoria.





NEW EXHAUST PYROMETER FOR DIESEL TRUCKS

IT HAS been shown that for every load, road and speed conditions, there is a "one best" gear ratio that gives most economical engine operation. The truck driver can determine this best ratio. . . if he knows the engine speed in rpm's, the exhaust gas temperature and the engine operating characteristics. The driver can learn the engine speed merely by reading the tachometer; a pyrometer can tell him the exhaust gas temperature. But, even if he knows the engine operating characteristics, how can he drive the truck and at the same time do all the mental arithmetic necessary to come up with the right answer that tells him of either overfueling and/or restricted air cleaner which overloads and over-

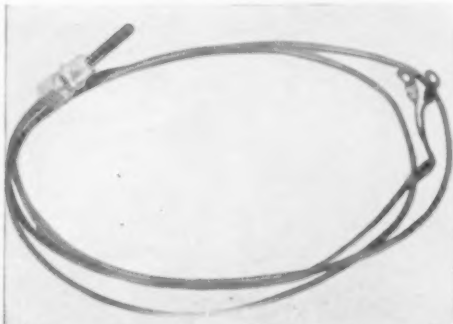
heats the engine and can also be a cause of turbo-charger bearing failure?

The research department of a truck and engine manufacturer recently completed studies of this problem and has come up with an answer as far as their engines are concerned. They plotted a family of temperature/rpm curves for their entire line of engines and then translated this information into a composite picture which resulted in an instrument scale which has a red (danger) and a green (normal) zone marking. This scale has been patented and, of course, the values indicated are good only for the line of engines tested. A scale, however, could be calculated and produced for any diesel used in trucking service.

Systematic checks and tests have shown that operation in the "normal" range results in less fuel consumption and smoother operation. And,—what is much more important: many more hours of use can be obtained from an engine before downtime or engine overhauls are required!

A special pyrometer to measure and indicate exhaust temperatures for this application has been developed by Illinois Testing Laboratories, Inc. To fill the requirements of this job the Alnor pyrometer had to meet, in addition to the usual instrument design needs, requirements for a thermocouple that is rugged, yet gives speedy response to changing exhaust gas temperature, is also easily installed, has a reasonably long life and is rust-proof. Also, the complete instrument dial had to

Thermocouple and connecting wire assembly. Thermocouple is mounted in engine exhaust manifold or on turbo-charger outlet boss.



View of Alnor indicating pyrometer developed for a diesel engine manufacturer. Note simplicity and readability of scale.

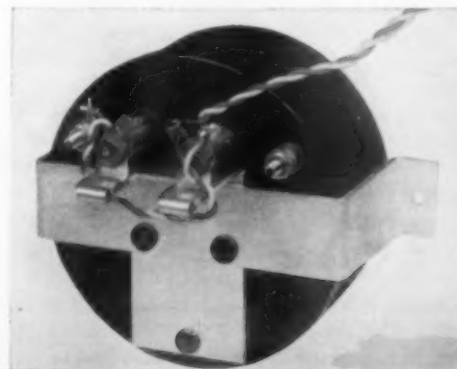
have the right configuration and size for easy visibility, yet be small enough for mounting on the vehicle's dashboard.

Chromel-alumel was the alloy chosen for the thermocoupling and connecting wire assembly because the range of the instrument was high enough and because rusting was to be avoided. Since quick response of the thermocouple is important (so it would faithfully follow temperature changes of the exhaust gas) the thermocouple wires are welded into the end of the thin wall, stainless tube protection tubing. The thermocouple wires are insulated with silicone impregnated glass and asbestos over each conductor and then a metallic spiral is wound over both to prevent possible damage from vibration, abrasion, heat, water, and oil. Instead of a separate connecting wire to the instrument, one long length of thermocouple wire was used, to run from the instrument terminals down to the tip of the protection tube. In this way, no connectors, terminal housing or splicing are required.

A cold end compensator—a bi-metallic spiral of proper alloy materials,—automatically adjusts the indicating pointer to the proper ambient temperature. Other design considerations that entered into production of the new instrument included an impregnated frameless copper wire coil; pivots with tough Monel shafts to minimize breakage and hard osmium tips to reduce friction; sapphire, deep-set, vee bearings; phosphor-bronze hair springs, gold plated to resist corrosion due to sulphur-laden operating atmosphere; movement frame machined from a solid bar of aluminum to assure perfect alignments and a self-shielding movement, utilizing a pair of Alnico No. 5 magnets which are used to assure a strong magnetic field in the movement air gap.

This system of measuring temperatures and informing the driver by simple color zones of his gear shifting responsibilities can result in tangible savings—but only if the driver watches the instrument and is motivated by the information it gives. In the final analysis, the importance of the driver here is critical—he is the only one who can provide the "feed-back" necessary to insure economical operation.

Rear view showing terminals for connecting cable assembly. Note ruggedness of the instrument design. Two lamp sockets in center are for scale illumination.





Hillside Transit Co., of Milwaukee has 13 TropicAire/Coldmobile reefer units equipped with Continental diesel engines. Here a Hillside maintenance man gives one of the units a check-over.

HIGHWAY REEFERS CONTINUE TO DIESELIZE

Truck Fleet Owners Finding Diesel Mobile Reefer Units Give Dependable Service, Lower Costs and Hold Desired Trailer Temperatures; Here is a Report on TropicAire's Product in Use

By ANTHONY A. ALBERTE*

AS refrigerated cargo hauling becomes a larger and larger portion of trucking operations, fleet owners face the ever present possibility of equipment failures. Operational failure of a mobile refrigeration unit while on the road can be costly not only in time and repair charges but in possible load spoilage as well.

Truckers have been eager to see development of dependable, trouble free reefer units that will maintain temperatures and protect them from equipment failures. And in recent years, development in lightweight diesel engines promise to relieve the problem through diesel's inherent freedom from some of the features that cause failures. Dependability of lightweight diesels, plus lower

operating costs, has already put diesel reefer packages under many long haul trailers and holds promise of invading the shorter haul field as well.

"We've never lost a load protected by a diesel refrigerator unit," stated R. Ken Learmont, superintendent of maintenance for Hillside Transit Co., Inc. Hillside, a Milwaukee based firm, is a contract hauler for a large food chain. The trucking company makes rigidly scheduled deliveries to stores in about 35 different zones in Wisconsin and Upper Michigan, hauling over 1 million lbs. of controlled temperature cargo every week. Hillside's fleet includes 150 tractors, 65 of them diesel, and 350 trailers. Of the trailers, 55 are equipped with refrigerator units, 13 of those are diesel. In addition to "one temperature" loads, much of Hillside's cargo consists of mixed loads that re-

quire two or more different temperature levels.

Hillside has developed and patented a special fan-equipped movable bulkhead, that allows carefully controlled, but different temperatures, in different parts of the van; the coldest point at the nose with increased settings as needed to the rear. At times, and as do others, the firm might use their units for heating cargo. For instance, when a load of produce is loaded in Milwaukee, outside temperatures might require moderate refrigeration. But as the truck heads up north the outside temperature might drop. In that case the reefer unit automatically goes into a heating cycle to bring the temperature in the van up to the required setting.

Hillside's 13 diesel reefers are TropicAire/Coldmobile units, built by the Transportation (formerly TropicAire) Division of McGraw-Edison Co.

*Associate Editor

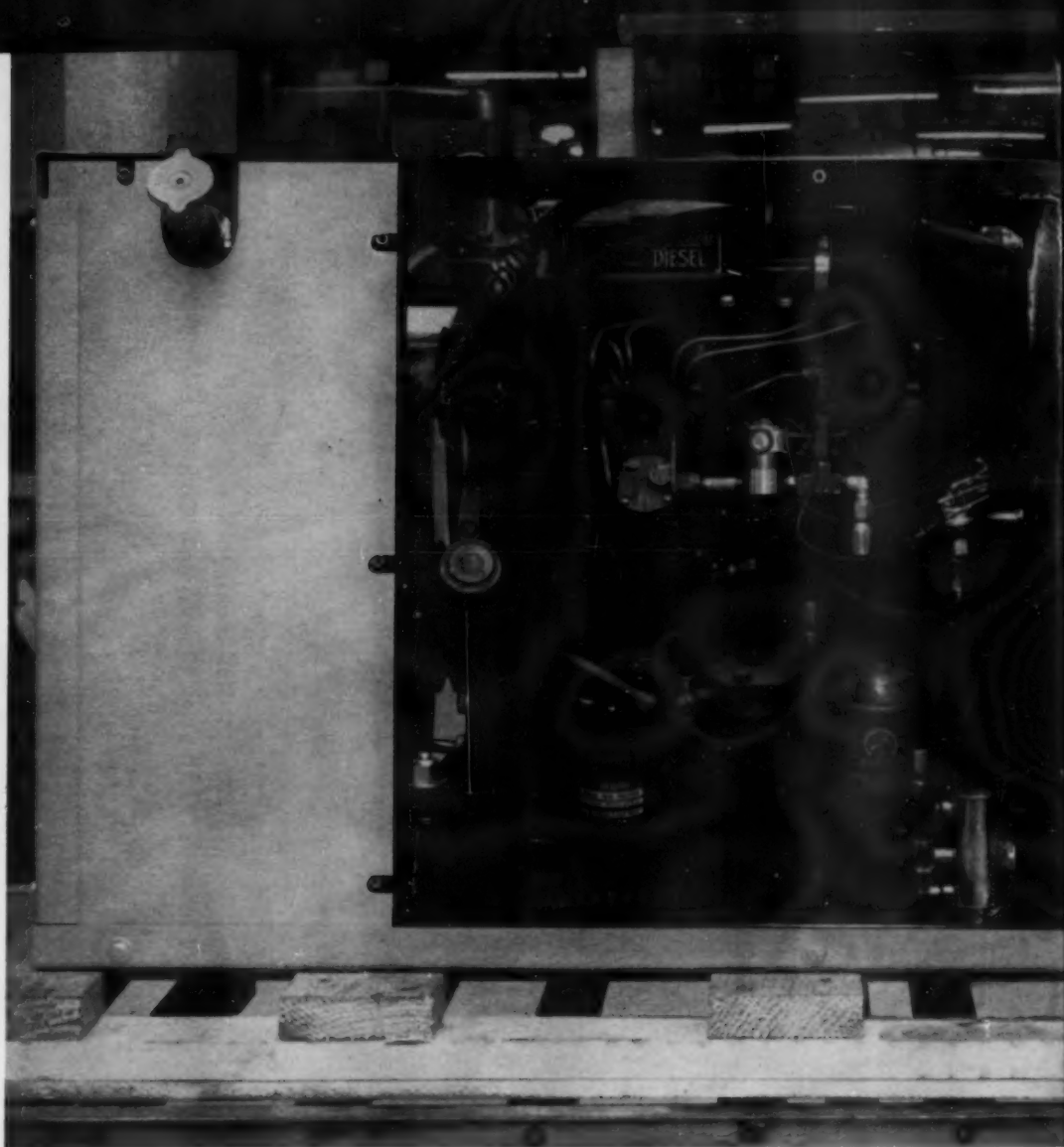
View of TropicAire unit on the production line. Behind panel at the left are the condenser and engine radiator. Panel in compartment allows starting from that point, has ammeter, hour meter, safety switch to prevent starting from nose-mounted control box. Engine is four cylinder Continental ZD-129 rated 31.3 hp at 1800 rpm. Note Fram fuel oil and lube oil filters, Roosa Master fuel injection pump, Delco-Remy starter. Bendix pump at lower right center is used during engine starting only.

Eight are 5 ton models, the other five are of 8 ton capacity. Transportation Cooling entered the transport refrigeration field as an outgrowth of its development of air conditioning equipment for intercity buses. The division claims the distinction of designing and developing the first air conditioning unit ever installed on a motor coach, for the Greyhound Corp., in 1936. This installation was powered by a gasoline engine. Eventually Greyhound expressed interest in using diesel engines in their air conditioning units. Their reasons: common fuel, servicemen familiar with diesel, lower operating costs and extended service life.

Transportation Cooling took the problem to Continental Motor Corp., engineers. The eventual outcome of development work was the ZD-129 diesel engine used today on both the 5 ton and 8 ton TropicAire/Coldmobile units. Either model has a cooling range from plus 70 to minus 20 degrees F.

The ZD-129 was applied to the transport refrigeration field four years ago and was one of the first diesel engines to be used in the application. According to Robert E. Read, Transportation Cooling general sales manager, adaptation of the diesel to the reefer field has met enthusiastic reception from truck operators.

"Diesel units constituted at least 20 per cent of our production in 1959 and we expect diesels to account for 40 per cent of our sales in 1960," Read said. "The reception has been entirely a matter of greatly reduced maintenance costs, much higher



Refrigeration unit is slung under trailer body. Fuel tank is just forward of the underslung box. Evaporator is completely enclosed in the nose of the trailer.



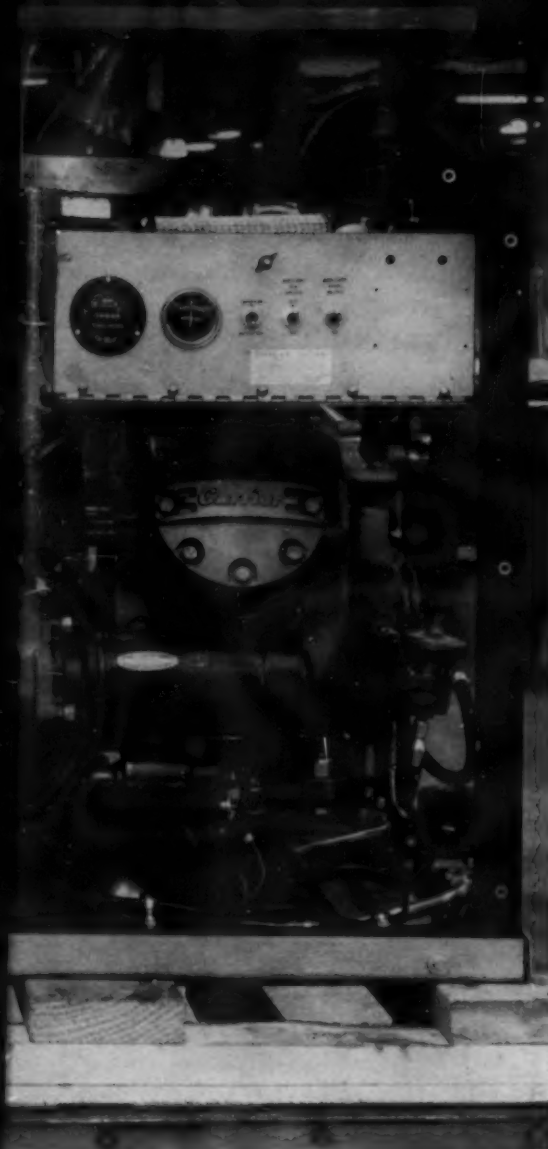
degree of unit dependability and very definitely a longer service life."

The ZD-129 is a four cylinder, four cycle engine with a rating of 31.3 cont hp at 1800 rpm. Bore and stroke are $3\frac{1}{4} \times 3\frac{3}{8}$ in., and piston displacement is 129 cu. in. Installed in the engine compartment, the ZD-129 is tilted 17 degrees. The tilt gives a lube oil capacity of nine quarts. In keeping with the lower maintenance concept, the engine is equipped with standard accessories: Fram fuel oil and air intake filters, Delco-Remy starter and generators, Roosa Master fuel pump. Arrangement of the engine compartment has been designed so all normal service and maintenance operations can be carried out from one side.

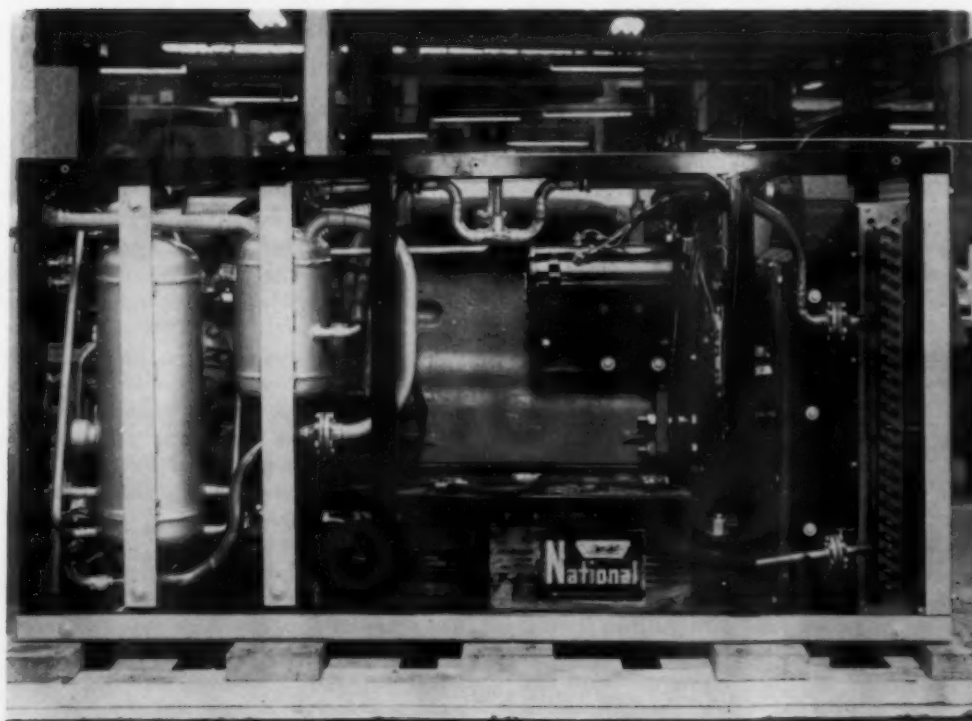
The TropicAire/Coldmobile unit is made up of three separate assemblies: the engine-compressor compartment which is mounted under the trailer, the evaporator unit which is installed in the nose of the van and a control panel which is mounted on the front of the trailer where it is easily visible from the tractor cab. A fuel tank can be mounted as the customer prefers. Connections between the compressor and evaporator assemblies are by means of self-sealing lines which permit easy breaking of the connection without necessity of pumping down or refrigerant loss.

Lineup of the components in the engine-compressor compartment includes the condenser coil, engine radiator, engine and compressor. The refrigeration





View of unit from the rear. At left are liquid receiver and re-evaporator tanks, at right condenser and engine radiator. Delco-Remy generator charges batteries and powers evaporator fan.



erant receiver tank is also in the compartment, between, but alongside, the engine and the compressor assemblies.

The engine drives the Carrier compressor, a 5F20 in the case of the 5 ton model or a 5F30 for the 8 ton unit, directly from the flywheel through a flexible coupling. At the forward end, a direct connection from the engine crankshaft pulley drives a 22 in. dia., 4000 cfm fan which cools the refrigerant in the condenser and also cools the water in the engine radiator. The engine also drives a Delco-Remy generator which powers the evaporator fans, one for the 5 ton model, two for the eight ton unit. The control panel has lights to indicate the cooling, heating and defrost cycle, fuel level and engine and trailer temperature gauges, and starter, night light and manual defrost switches. An engine hour meter is also on the panel. An auxiliary panel in the engine compartment allows servicemen to start the engine from that location. The engine is equipped with high water temperature and low oil pressure shutoff devices.

Regarding fuel consumption, Read stated that tests showed consumption for the diesel engine is about .7 gals./hr. compared with 1.25 gals. for a gasoline engine of comparable rating and service. The reefer unit in operation runs at a constant 1800 rpm, a speed set during assembly. Temperature control in the setup is achieved by valving in the compressor which "unloads" the compressor when the trailer temperature is at the level called for by the thermostat setting.

On current models defrosting is accomplished by a timer which is set for periodic defrosting of the coil. If the evaporator does not require defrosting, there is a momentary pause after which the unit continues to refrigerate. Automatic operation of the units is used to advantage by Hillside, for instance, when schedules call for loading a van on Friday even though it might not be scheduled to leave on its run until Monday morning. The van



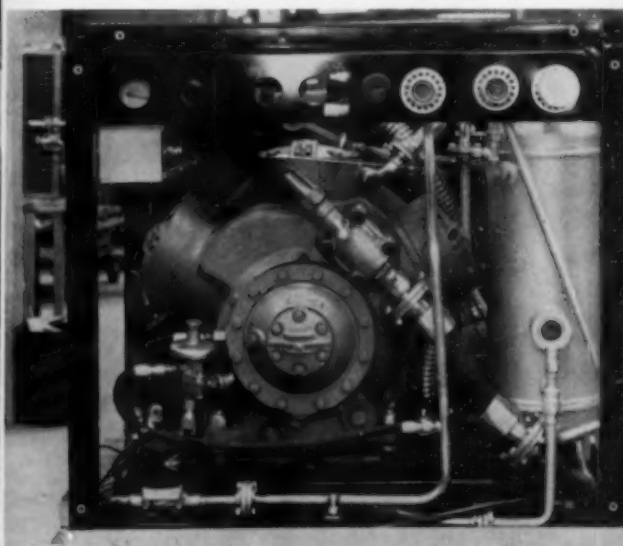
Control box is mounted on the nose of the trailer, where it can be seen from the tractor cab. Panel contains engine controls, trailer temperature dial and temperature control dial. Row of lights at top indicate, from right, whether reefer unit is on defrost, heating or cooling cycle. Fourth light illuminates control panel.

can be loaded, the reefer engine started and the unit will operate without attention over the weekend, holding van temperature at the level required by the load.

Principal Equipment

Engine	Continental
Compressor	Carrier
Generators	Delco-Remy
Fuel injection pump	Roosa Master
Fuel oil filters	Fram
Air intake filter, dry type	Fram

View from compressor end. This compartment is joined to evaporator by means of Aeroquip self-sealing lines which couple at connections at upper right.





DIESEL SERVICE PROGRESS

A COMMENTARY BY GEORGE R. MACKEY

George R. Mackey was long associated with Detroit Diesel Engine Division of General Motors Corp., and had prior experience as a mechanic in Europe and the U.S.A., which enabled him to become well acquainted in the diesel and service fields and to obtain a broad scope of the service industry from the customer's and management's viewpoint. Further training at Carnegie Tech and in the Army Ordnance during World War II provided the necessary requirements in planning service programs. Progressive advancement in diesel service areas in General Motors and with Detroit Diesel led to his position as Supervisor of Service Promotion. Upon termination of employment with General Motors in 1952, he joined Clayton Manufacturing Company, and his present position with this organization is Sales Manager of the Dynamometer Division.

Customer Selection and Handling

MANAGEMENT of an aggressive business organization will spend a great many hours and invest a considerable amount of money, to attract new customers as well as retain steady customers. This is as it should be. Such planning, however, while attracting the wanted customer who through his purchases contributes to the profitable operation of a business establishment, also invites the type of customer who sometimes costs more in his demands and complaints than the total amount of his purchases. It becomes, therefore, the responsibility of management to determine what makes a good customer and how undesirable customers can be weeded out or encouraged to take their business elsewhere.

Practically every retail diesel repair shop can point out a number of customers who are a load to carry, and for various reasons, with whom it is unprofitable to do business. Naturally, a business minded manager will not discard any account or avoid doing business with an individual without first determining "why", and to see in some way or another what might possibly be done to salvage the account so he will become a desirable customer. For example, if long experience with a particular customer has proven that he will only permit minimum emergency repairs to be made on an engine which is completely worn-out and will not listen to the engines actual service needs, it might be well to weed him out. Others may have experienced the individual who purchases an old used engine, possibly at some junk yard, and expects to have a first-class engine operation from the purchase of a tune up. This type often complains of incompetent mechanics or if some major problem arises, tries to put the blame on the person performing the job. There are still other individuals who insist on furnishing their own parts and material. Experience shows that in general, this type of business is unsatisfactory. Usually they will want to furnish substandard used or possibly "mail order" parts. This type of business can often result in having the wrong parts or material, the job being held up, shop schedules thrown off, valuable productive shop space tied up and quite often a

customer who continuously condemns and criticizes the "lousy service".

These are the people who can easily drive a service manager or shop foreman to distraction. How many service operators have been "suckered in" to some of these types of service jobs and have wondered how they can possibly justify the time and expense, or the lack of profit from such business. While we all realize that without customers there would be no business, a careful evaluation will often pinpoint customers we are better off without. When making a customer evaluation a person cannot be hasty and must think out each case carefully. Then, plans must be made to proceed diplomatically to eliminate the undesirable type of business with a minimum of effort or attention and without causing hard feelings.

When evaluating a customer's disposition or business potential, it is well for a manager to ask himself certain questions. Is this situation continuously prevalent or only a temporary situation? Is it an impossible continuing situation? Is the situation the fault of the customer or is it caused by the mishandling of someone in the servicing organization? Has a definite plan to try to please the customer ever been tried? If the answers to all of these questions and others indicate the account undesirable then act at once, because if he is too demanding, if he disrupts morale, if he is a chiseler or habitual griper or makes unfair claims, he is definitely bad for business. Let a price cutting competitor have him, maybe they will both be the same type of person and may both go broke trying to satisfy or outwit each other.

Even after undesirable customers are disposed of, there are many other types who may require special handling. Since people differ in their habits, vocations, attitudes, physical abilities and desires they must be dealt with as individuals, as all pegs will not fit the same hole. Anyone dealing with the public could very likely set forth quite an impressive list of different types of personalities with which he may have to deal. Such a list would in-

clude 1. the bossy type 2. the timid soul 3. the bully 4. the smart aleck 5. the friendly type 6. the grouch 7. the show off 8. the silent type 9. the fuss budget 10. the technical type 11. the chiseler. Naturally there are methods which can be employed in the handling of these types of people. For those who are in constant contact with them it can be very interesting to consider the handling of some types as a challenge—"I recognize your type and I'm going to be clever enough to deal with you and get results in spite of your peculiarities. It's a game two can play and I'm betting on myself, because it's a part of my job to know how to negotiate with all types of people".

Very often the practice of common courtesy in dealing with a customer is possibly the most important single factor in dealing with customers. Some of the points of common courtesy which will pay dividends in good customer relations and may even change the disposition of hard-to-handle customers are found in the basic rules: 1. A prompt greeting will make a customer feel important and, if we call him by name, he will feel we appreciate his business enough to go to the trouble of remembering his name. 2. A friendly smile never hurt anyone in creating good relations, and it will often breakdown an existing barrier far better than a frown. 3. Listening attentively will go a long way with a customer and he will feel you are genuinely interested in his problems. 4. By arguing, a customer may carry the idea we may not agree and are inclined not to respect his opinion. 5. Being truthful helps to inspire confidence. 6. By not being too forward we are less likely to offend. 7. Statements such as, "I can appreciate your feelings", or, "I can understand why you think that way", will show a respect for the customer's opinion and will give us something to say besides, "Yes". 8. A suggested word will at times get the customer back on the track or introduce a new thought.

The treatment of all customers is based upon common sense, thorough knowledge of the product involved, a complete knowledge of business policy and a sincere desire to serve.

MIAMI'S TUGBOAT RACE



The pack of Miami's workhorses of the sea making like hares. Running at top speeds with their governors wide open, the powerful craft churned the waters of Government Cut in the annual Maritime Day tugboat race.

By ED DENNIS

MIAMI'S sixth annual tugboat race for Maritime Day 1960, reached its climax when Capt. M. D. Brinn put the 92 foot *Battler* of Port Everglades across the finish line in 12 minutes, 12 seconds with the little 40 ft. *Adele* right on his tail 13 seconds later.

To many of the thousands of spectators who lined the MacArthur causeway and Watson Park shores, there were some exciting moments as the 72-year-old *Battler*, powered with a Cooper-Bessemer 850 hp diesel engine, battled her way clear at the starting line, secured the lead and kept it to the thrilling finish.

The skippers gave the workhorses all the speed the diesel engines had in them and the tremendous bow and stern waves gave the scene the picturesque touch so dear to the hearts of tugboaters.

A Coast Guard patrol vessel cleared the two mile course in Government Cut from the Coast Guard Station and channel marker No. 9 to the finish line at marker 21, entrance of the harbor's turning basin. It was from the Coast Guard patrol vessel that the race was televised and local radio stations kept a direct "blow by blow" account via ship to shore telephone direct to the listeners.

Rivalry is true to form in any type of racing with the competition running highest in the heavy-weight division and the tug *Battler* is in the heavy-weight class. Built in Camden, N.J. in 1892 as a steam propelled tow boat, the veteran saw service

all along the East Coast of the United States and in World War II as a rescue tug for torpedoed tankers. In the latter part of 1951 she was re-powered with a model JS8 Cooper-Bessemer 850 hp diesel engine, direct reversible and swings a 70 in. x 40 in. propeller. During the race, Capt. Brinn, had the engines turning at a top of 395 rpm. The Port Everglades Towing Co. acquired the *Battler* in 1951 and operates several other towboats about the same size in Florida waters.

Taking the outside lane in the Government Cut lineup, where the banging and bumping would have enraged sailboat skippers, Capt. Leslie John-

son, rode the fringe of the pack to second place honors in the tiny 40 ft. *Adele* just a towboat's length behind the *Battler* and for first place for entries under 50 feet. Specifications on the *Adele* are: powered with a General Motors 6-71, 175 hp diesel, 3:1 Twin Disc and a Columbian 40 in. x 24 in. three-blade propeller. Turning at 2100 rpm, her speed in the race was 12 minutes 25 seconds.

The event, held on May 19th, was sponsored jointly by the Propeller Clubs of the Port of Miami and Port Everglades, Fla. The winners were presented with trophies at the Club's annual dinner and dance held on board the *S. S. Evangeline*.

The 92 ft. tug *Battler*, owned by Port Everglades Towing Co., Port Everglades, Florida, crossing the finish line, channel marker 21, in Government Cut, entrance to Miami, Fla. Powered by a model JS8 Cooper-Bessemer, 850 hp diesel, the 72-year-old youngster covered the course in 12 minutes 12 seconds to a thrilling finish.





WHAT'S GOING ON IN ENGLAND

CONDUCTED BY BERNARD W. LANSDOWNE

Bernard W. Lansdowne is an associate member of the Institution of Mechanical Engineers and is widely known among British and European diesel manufacturers as a former editor of our English contemporary "Gas & Oil Power." His early workshop training was spread over seven years with A.E.C. Ltd., Southall, following which he served some five years with that company's sales engineering department. He is now manager-for-the-United Kingdom of a group of business and technical publications.

New Research Facilities

VAUXHALL Motors Ltd. at Luton, the British end of General Motors Corporation have recently brought into operation a new research center to handle the engine development side of the company's activities. The new building provides 8,000 sq. ft. on two floors and includes four dynamometer rooms, a carburetion and fuel injection test room together with other rooms for equipment, services, stores and administration. The three dynamometers already installed are American-built, direct-current units by General Electric Co. of Schenectady. Each is of 150 hp capacity with a maximum speed of 6,000 rpm.

A fourth dynamometer, British-built by Hennan & Froude, will have a capacity of 200 hp and a maximum speed of 5,000 rpm. This unit is due for installation shortly. The new dynamometers supplement nine existing units already in service in the company's main engineering building and a later expansion program is planned to bring the total of test room research dynamometers up to 16 of various types to handle the company's diesel engine and gasoline unit needs. It is also planned to add a vehicle dynamometer on which tests of engines in vehicles can be carried out and a new cold room for low temperature tests.

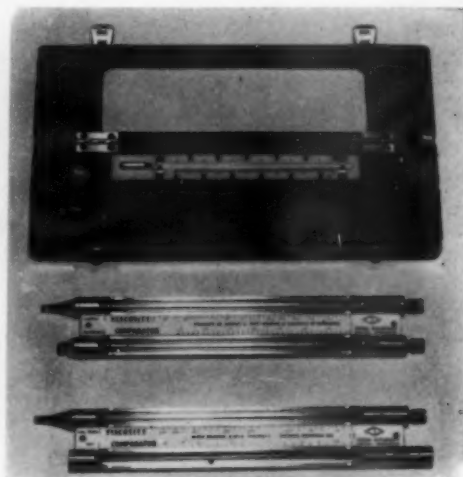
Auxiliary equipment rooms are located between the dynamometer rooms and these house oil and water heat-exchangers, vacuum pumps, electric switch and fuse gears and storage cylinders for the automatic fire protection system. Other facilities in the new building include all the equipment necessary for checking and testing diesel engine fuel injection and fuel supply systems.

Vauxhall have been marketing their own diesel engines for just over three years. Before that they fitted proprietary power units. It was in January 1957 that their first diesel was announced, the 6-cylinder Bedford unit, which was followed later that year by the production of a 4-cylinder unit.

On-The-Spot Lube-oil Checks

A lightweight portable instrument for checking lubricating oil viscosity and dilution is now available from Control Developments Ltd. of Gorton, Manchester, England. It is intended essentially for lubrication engineers and diesel engineers to facilitate the testing of lubricating oil conditions.

The proper control of lubrication and the early diagnosis of dangerous oil conditions can do much to improve engine operation and reduce maintenance costs. Deterioration of the lubricant by

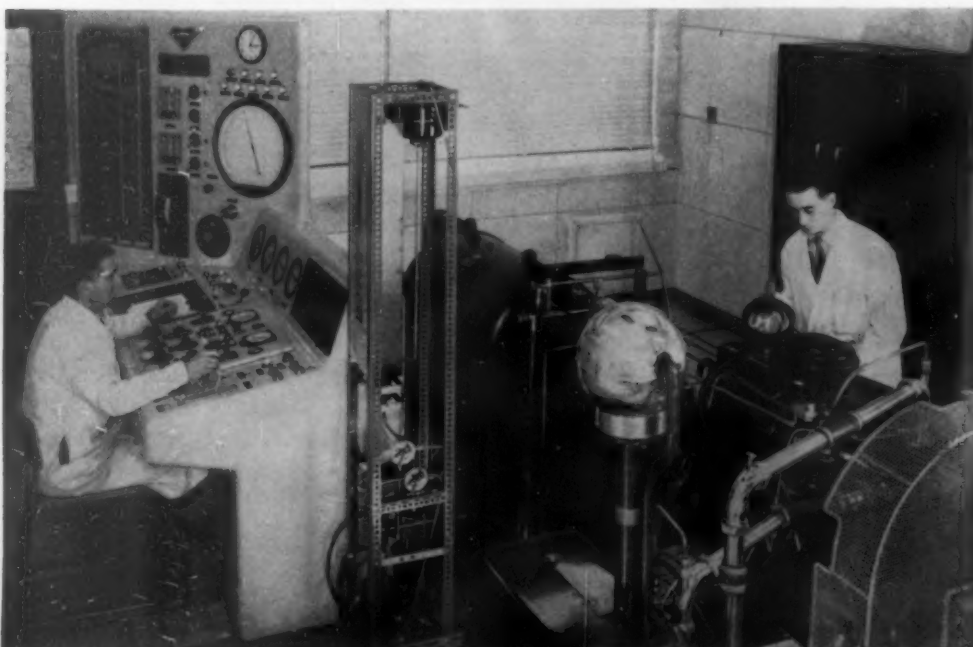


The new C-D type portable viscosity comparator.

oxidation or polymerization, dilution by unburnt fuel and contamination by the products of incomplete combustion are all factors which affect the viscosity of an engine lubricating oil.

The new instrument is a pocket size design which can be used to provide a simple means of comparing viscosity of an oil sample with that of a reference oil of known characteristics. It consists of a pair of rolling sphere viscometers built as a single unit. One of the tube assemblies is used as a reference and is filled with certified oil. The scale is calibrated with respect to the reference tube at 70° F. and when the instrument is used at or near to this temperature it will give direct viscosity readings. Simple correction data is supplied for use at other ambient temperatures. The viscometer tube which contains the oil to be tested houses a stainless steel ball and is fitted with a nozzle and plunger to permit easy filling. The sealed reference tube contains an identical steel ball and is fitted with an expansion gland to permit free expansion and contraction of the oil with changing temperatures. The "test oil" tube is filled with oil from the engine sump and both steel spheres are brought to the nozzle end by tilting the instrument. It is then tilted the other way. As the leading sphere approaches the full scale mark the instrument is gently brought to a horizontal position so that the sphere comes to rest at this mark. The position of the other sphere then indicates on the scale the viscosity of the oil being tested.

One of the four dynamometer rooms in Vauxhall Motors' new building. From the control panel on the left, conditions of speed, fuel, load, temperature, etc. can be precision-controlled. The operator on the right is checking timing with a stroboscope.



Lebanon Buys LSV-16-GDT



The newest engine for Lebanon Ohio's Power plant is this Cooper-Bessemer LSV-16-GDT

Cooper-Bessemer has been one of the leading companies in furnishing engines to municipalities for power generation for many decades. One of C-B's good customers for many years has been the village of Lebanon, Ohio, a beautiful town with much historic background. In 1940 C-B sold two LS-8's to the town. Each engine develops 700 kw at 300 rpm. These units were the third and fourth LS-8's built by Cooper-Bessemer and have given good service to municipality. In 1956 Lebanon bought an LSV-12-GDT which develops 2,000 kw at 327 rpm. Town officials decided to purchase an LSV-16-GDT, the largest engine made by C-B in November 1959. Delivery was made in April 1960. The LSV-16-GDT is rated at 4,480 hp at 327 rpm, developing 3,500 kw. Town officials stated they were able to pay half the cost of the LSV-16 through savings made with the LSV-12. In addition to these units, Lebanon bought En-Tronic controls to automatically control the operation of the units.

AMF—Beaird To Manufacture, Distribute Maxim Silencers

The J. B. Beaird Co., Inc., Shreveport, La., has added the manufacture and distribution of Maxim Silencers and heat recovery units to its existing product lines. John L. Tullis, president, has announced. Acquisition of the Maxim products was made possible through the recent purchase of the Maxim Division from Emhart Manufacturing Co., Hartford, Conn., by American Machine & Foundry Co., New York, of which Beaird is a wholly owned subsidiary. Specialized machinery, jigs and fixtures used in producing the silencers have been transferred to the Beaird plant, and the Shreveport-based company is already engaged in filling Maxim contracts. Maxim engineers Donald Bradford, Allen Pease, and James Stewart have also joined Beaird and are helping to facilitate the

A Beaird-Maxim JEM-10 silencer in operation with a U. S. Navy F8U fighter.



transition. No change is contemplated in the present Maxim sales agency arrangement, Gerald Pope, Beaird vice president of sales, has stated.

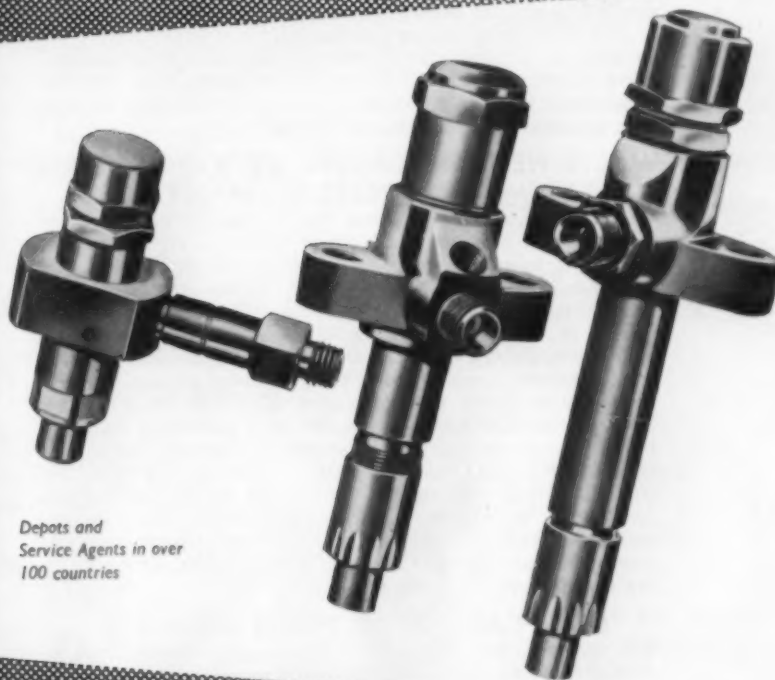
End Sales Agreement

Termination of the agreement between Diesel Energy Corp. of New York and the Industrial and Marine Division of Chrysler Corp. for the sale of Deutz diesel engines in the United States has been announced. According to reliable industry sources, the cancellation was in the best interest of both companies and full sales and service will now be handled directly by Diesel Energy Corp. and its established distributor organization. Headquartered in New York at 82 Beaver Street, the company's principal personnel are Dr. F. W.

Lohmann and Dr. Fritz Tamusinno, vice presidents; Werner Schmitz, sales manager; Gene Gore, manager field engineering; and Phillip Adolf, chief project engineer. Deutz diesel engines are built in both air-cooled and engine cooled types and are available to 2000 hp for a wide range of stationary, mobile and marine applications.

READY NOW! The completely new 1960 edition of the **DIESEL AND GAS ENGINE CATALOG**, Volume 25, can now be purchased. If you design, purchase, sell, operate or service diesel, dual fuel, or gas engines, the Catalog is essential to you and your business. This giant, 442 page, 10½ x 13½", fully illustrated reference book has been rewritten, revised and brought up to date completely from cover to cover. Send your order in now for this limited edition, which costs just \$10 postpaid anywhere in the world. Send checks, money orders or company orders to **DIESEL AND GAS ENGINE CATALOG**, 9110 Sunset Blvd., Los Angeles 46, Calif.

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Another advantage to Vapor Phase is that with jacket temperature maintained at 212° F. to 250° F., depending upon the installation, engines can operate on low grade fuels such as sour gas, sewer gas and Bunker C fuel.

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HOW CAN VAPOR PHASE HELP YOU?

The uses to which Vapor Phase Cooling and Waste Heat Recovery Systems can be applied are increasing every day. Find out more about it; write for the full story on Vapor Phase economy in your operation.

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Stewart & Stevenson Promotions

A series of promotions and transfers has been made by Stewart & Stevenson Services, Inc., Houston, Tex., distributor of diesel engines, to keep abreast of expanding markets, President Donald Stevenson has announced. Joe Manning, formerly vice president and general manager, has been



Joe Manning



Charles Ward

named executive vice president. Charles Ward, who had been acting as assistant general manager, has assumed the position of general manager. Another change deals with the Stewart & Stevenson branches. Dick Conolly, formerly South Texas district manager with headquarters in Corpus Christi, has been named coordinator of branches. The San Juan branch, formerly operating as an offshoot of the Corpus Christi branch, now functions as a full branch operation under the responsibility of Dick Grant as branch manager. Tom Langham has been moved from credit manager to the position of assistant to the general manager with offices in Houston. N. N. Elkins, formerly sales manager at the Corpus Christi branch, is now Corpus Christi branch manager. The Beaumont operation, which has operated under the Houston offices, has now assumed a full branch status with Howard Perkins as branch manager.

Deliver 1000th Locomotive

The 1000th General Motors locomotive to be placed in Canadian service by the Canadian National Railways was delivered at a presentation ceremony at Central Station, Montreal, where S. F. Dingle, Vice President Operation, Canadian National Railways accepted the locomotive. The unit, a 1200 hp road switching locomotive and numbered 1371, was presented to the C.N.R. by E. V. Rippingille, Jr., president and general manager of General Motors Diesel Ltd.



Heads Coupling Firm



M. T. Thomas

Richard H. Crook has been elected president of the Thomas Flexible Coupling Co., Warren, Penn. Mr. Crook succeeds Millward T. Thomas, who founded the firm. Mr. Thomas died on March 13th. He was president and managing officer of the company from formation in 1914 until his

death. He was responsible for invention and development of the flexible power transmission coupling which made the company a leader in its field. Mr. Crook has long been associated with the company as a director and personal advisor to Mr. Thomas.

New Sales Manager



J. A. Wiendl

Joseph A. Wiendl has been appointed general manager of sales for Ingersoll-Rand Co. Before receiving this new assignment, Wiendl was assistant general manager of sales. He joined Ingersoll-Rand in 1941 following graduation from Montana School of Mines with a B.S.M.E. degree and was named assistant general manager of sales in February, 1959.

Turnpike Auto Hauling



The first double-trailer shipment of new automobiles has been instituted over the Indiana and Ohio Turnpikes by Bolin Drive-A-Way Co. of Cleveland, using a custom-engineered White tractor. Like other tandem-trailer operations over the two pikes, the double-bottom hauling of new compact cars is on a trial basis. The White tractor, a 5400TD fiberglass-cab model, was designed for the new Bolin operation by The White Motor Co.'s White Truck Division, and makes daily round trips five times a week between South Bend and Youngstown interchanges. The double trailers permit transport of 12 compacts at once. When the tractor reaches the Youngstown interchange, the cars are reloaded on conventional tractor and semi-trailer equipment and delivered to automobile dealers in eastern Pennsylvania and on the At-

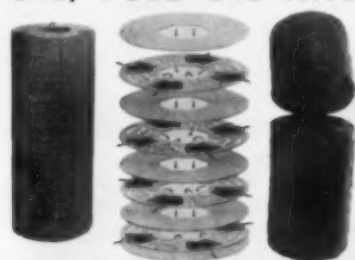
lantic Seaboard. After unloading, a dozen imported cars replace the compacts on the double-bottom and the White tractor returns to South Bend, where the foreign autos are distributed to dealers in the Midwest and western states. Each Friday night the tractor is returned to the Cleveland branch of The White Motor Company to undergo inspection in accordance with a rigid maintenance program established by White, Bolin and the Ohio Turnpike Commission. Every phase of Bolin's Turnpike Special—from its NH-220 Cummins engine which develops 220 hp at 2100 rpm, to the 10-speed Fuller transmission and 20,000 lb. capacity rear axle—is subjected to rigorous tests. The auto-hauling combination of White tractor and two 37½-ft. trailers with converter dolly has an over-all length of approximately 90 ft.

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THE HILLIARD CORPORATION
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West Coast News

By James Joseph

TO Lulay Bros., Scio, Ore., a 16000 Allis-Chalmers diesel rated 250 hp at 2100 rpm, for repowering an off-highway Kenworth rig.

BEGINNING U. S.'s biggest cement haul

(8,640,000 mi., 27,000 roundtrips, 3-years) at Glen Canyon Dam, Ariz., Belyea Truck Co.'s new fleet of 20 Autocar tractors (with 250 hp Cummins engines), with Frehauf trailers (payload capacity: 27¾ tons).

IN service for Crown Zellerbach, San Francisco, 9 GMC tractors powered by GMC 6V-71, 210 hp engines. Transmis-

sion: 5 speed Spicer with GMC 2 speed TA 185 rear end. Hauling from company's Antioch, Calif. mill to San Francisco Bay Area.

BIG Navajo Freight Lines, Inc., Denver, has in design a long-haul, over-highway truck which, employing the ground effect principle to "air cushion" and partially lift load from road, will likely

use diesels both as motive and fan-drive power.

TO Boise, Idaho's H. J. Wood Co., two American Marc AC-1 diesels, rated (continuous) 6.7 bhp at 2000 rpm. Engines are for pump service.

DELIVERED to the U. S. Marine Corps, San Diego, an American Marc AX 1.5-400 11½ kw diesel generator set, one of Marc's new, small, back-packable combines.

TO Pacific Marine Terminal Co., Los Angeles, an MD-1 Volvo, 5 hp at 2000 rpm diesel engine. By Advance Fuel Systems, Long Beach.

FOR Seaside, Oregon's Ordway & Koon, an American Model 599 40-plus ton crane with 165 hp diesel (Allis-Chalmers) and 15 in. Clark converter. Sale by Hamilton Engine Sales, Inc., Portland, Oregon.

TO Tideland Specialty Co., Houston, Texas, for pumping, two American Marc AC-1 engines, 6.7 bhp continuous at 2000 rpm.

FOR Modern Motors, Inc., Seattle, two 13AKF Clark Converters for installation behind 4-71 GMC diesel engines on log loaders working Washington state.

L. S. BAIER & Associates, Portland, has taken delivery of an Allis-Chalmers 6DAMR-273, 85 hp at 2800 rpm, with Capitol 2HD 10,200 hydraulic marine reverse and reduction gear . . . for powering a boat boom.

TO Lakeview Lumber Products Co., Lakeview, Ore., a Model 599 American crane, its upper works powered by a 165 hp diesel with 15 in. Clark Converter.

LOS ANGELES GM Diesel distributor Anderson-O'Brien Co. has opened branch service-sales offices in El Cajon, Calif., to service construction-marine-industrial equipment in four Southern California counties.

SIX new Allis-Chalmers 21000 diesels, for repowering Mack EN08D logging trucks, have gone to Potlatch Forests, Inc., Lewiston, Idaho, for their Bovill, Idaho, Camp 44. Sale by Hamilton Engine Sales, Inc. Portland.

TO Klamath Basin Pine Mills, Klamath Falls, Ore., a 6DAMR-516 Allis-Chalmers marine diesel (with 2HD Capitol gear).

FOR log loading on the Gilbert Logging Co. operation, Sweet Home, Ore., an American crane model 599 with DA-799 Allis-Chalmers diesel and 15AKOCP Clark Converter.

PERFECT CIRCLE PISTON RINGS ARE BUILT TO TAKE IT

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The searing heat that's created inside engine cylinders causes inferior piston rings to lose their strength and resilience, and wear out far before their time. That's why Perfect Circle employs special metallurgical skills to produce ring materials that have the high heat stability needed for long life.

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New F-M Division

Expanding into a new market, Fairbanks, Morse & Co. has established an Industrial Electronics Division, it was announced by Robert W. Kerr, president. The division's headquarters will be at the Fairbanks, Morse Center in Fair Lawn, N. J. The new division is the United States outlet for computers, closed circuit television apparatus and other products of EMI Electronics Ltd., of Hayes, England. The division is to implement the joint sales agreement between EMI Electronics and the Fairbanks Whitney Corp., parent of Fairbanks, Morse. Stanley Wolkenheim, vice president for marketing, has been named general manager of the new division. H. John Van Ness, of Rye, N. Y., electronics engineer, formerly manager of Teleregister Laboratories, transportation division, has joined Fairbanks, Morse as assistant vice president for the Industrial Electronics Division. He is responsible to Mr. Wolkenheim for setting up an electronics sales organization and administering its work through the 14 domestic sales branches of Fairbanks, Morse & Co. The British firm is a major supplier of electronics equipment to British military services and British industry. Among EMI products that will be marketed in the United States through Fairbanks, Morse are data-processing systems, analogue computers, scientific and industrial instruments, and electronic control and automation systems.

Cummins Regional Manager

Cummins Engine Co., Inc. announced appointment of Robert C. Browning as regional manager in charge of the Cummins office in Washington, D.C. to replace James L. Fri, who is entering his own business in Memphis. Mr. Browning will handle contract and liaison activities for Cummins with Government agencies in the Washington area.

Turbine for Pipeline

Okan Pipeline Co., Tulsa, Okla. has ordered a Solar Aircraft Saturn T-1000 gas turbine engine to be used with a booster pump in its main petroleum pipeline, it was announced by F. Q. Wilson, Solar manager of turbomachinery sales division. The engine and pump will be used to increase the capacity of the 407 mile-long pipeline which runs from southwestern Kansas to Tulsa. The pipeline carries liquid petroleum products such as refined furnace oil, motor gasolines, natural gasoline and LPG liquefied petroleum gases. For this installation Okan will use the variable speed version of the 1100 hp Saturn turbine. The engine will burn liquid butane the majority of the time but will be capable of burning other refined liquid fuels such as kerosene or gasoline. Fuel for

the gas turbine will be taken from the main pipeline and stored in a tank at the pump station site.

Buy 13 Diesel Tractors

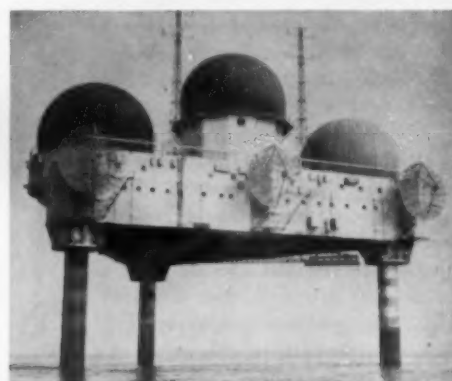
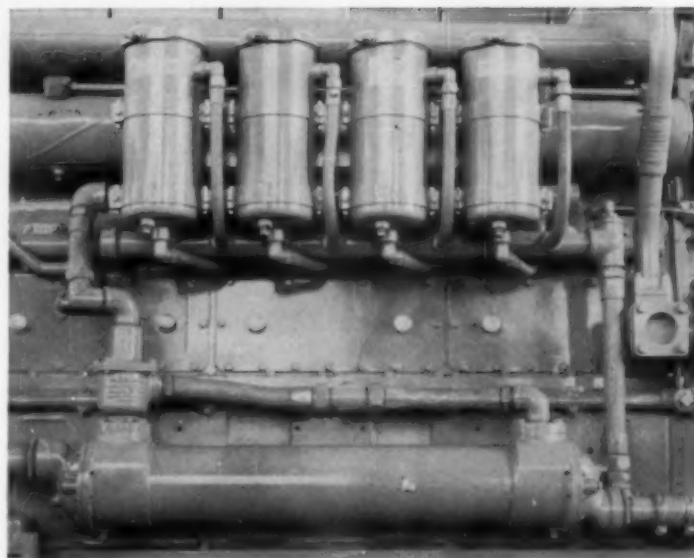
Toledo Cartage Co. has purchased 13 custom-engineered White 4464TD tandem tractors for transporting bulk cement, it was announced by J. W. DeVenne, executive vice president of the

Toledo (Ohio) company. Toledo Cartage is a division of Cleveland Cartage, which now has more than 400 White trucks and tractors in operation. The 4464TD models have 220-hp diesel engine, rear axle with 34,000-pound rating, and 10-speed transmission. The bulk of Toledo Cartage cement hauling is done in the Toledo area and between that city and Cleveland.

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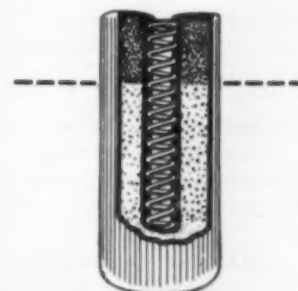
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Mid-West Diesel News

By L. H. Houck

HUSMAN & Roper Freight Lines, St. Louis, are running a number of new Dodge diesel LCF models—possibly first Dodge diesels in fleet service. Engines are Cummins.

NEWLIN Machinery Corp., Kansas City, Allis-Chalmers dealers, have added the A-C power unit line of diesel-electric units. One of the first sales was a standby generating diesel unit for Radio Station KCMO.

KROGER, a well known food chain operator, has added 40 new GMC diesel tractors to its fleet. Units are GMC steel tilt-cabs, Model DL7000. Kroger now operates 309 GMC diesels.

UNUSUAL outdoors demonstration of dieselized construction equipment was staged by D. D. Kennedy, Bellwood, Ill., distributor Allis-Chalmers, Bucyrus-Erie, Gradall, Cleveland trenchers, on a 20 acre tract near Bellwood. Three-day road show attended by contractors and public officials and all equipment operated under working conditions.

THIRTEEN Kenworth heavy-duty trucks to Morrison-Knudsen Co., Inc., Boise, Idaho, with Cummins diesels, and distributed to several M-K highway jobs in Idaho.

FRED Boyles & Son, contractors, Garnett, Kan., have taken delivery of an Allis-Chalmers 11-E tractor with dozer from Newlin Machinery, Inc., Kansas City.

CUMMINS Kansas City, Joplin branch, has repowered an International RDC-405 with an NH-250 Cummins diesel for Bob Krutsinger, Joplin, for use in coast-to-coast produce run. Transmission is Spicer.

INLAND GM Diesel, Inc., Milwaukee, has installed a 6-110 GM diesel in a crusher operation for Wm. J. Kennedy & Son, Janesville, Wis.

JACKSON Lumber Harvester Co., Mondovi, Wis., has installed a GM 4-71 engine in a portable saw mill. Sale by Inland GM Diesel, Milwaukee.

YELLOW TRANSIT has added 25 C-175 Cummins turbo engines to its fleet of almost 350 units, using Cummins.

OBSERVED: Dardanelle Lock & Dam, Arkansas River job. Guy H. James, Oklahoma City, holds \$3 million contract: Manitowoc 3900 with Cummins diesel; Northwest 80-D, Murphy diesel; Manitowoc 4000, Cummins diesel; Pioneer jaw crusher with Caterpillar diesel;

Ingersoll-Rand 600 cfm air compressors with 6-110 GM diesels.

KEN Kisting, Mt. Sterling, Wis., has installed a GM 3-71 in a Warner Swasey Hopto trencher, from Inland GM Diesel, Inc., Milwaukee.

TWO GM 6-110 diesels to F. F. Mengel Co., Custer, Wis., for crusher operation, from Inland, Milwaukee.

BRADLEYVILLE Saw Mill Co., Bradleyville, Mo. has installed a Cummins JN6P, 130 hp diesel with Twin Disc clutch to its power equipment from Cummins, Kansas City.

FIFTEEN, 54-passenger, air conditioned, GM coaches with GM diesels and Allison transmissions to Valley Transit Lines, Phoenix, Ariz.

S. J. GROVES & Sons Construction Co., have moved two Northwest 80-D shovels with Murphy diesels, erected new on the Grand Portage highway job near Canadian line, to new Mid-West contracts.

FRED HALL & Sons, Valley Mills, Tex., now have more than 13 Murphy diesels powering its Pioneer crushing plants and Northwest shovels, as well as sev-

all new

CHRYSLER GASOLINE
NINE BASIC MODELS 170 to 413 cu. in. disp. (four shown)

PERKINS DIESEL
SIX BASIC MODELS 20 to 130 horsepower (four shown)

eral Murphy generator sets. Hall is a contractor and large producer of aggregates for highway construction.

NEW LeTourneau-Westinghouse V-power B pull, with 12V-71 GM diesel, 430 hp, 12 cylinder, is now in production and Mid-West dealers, Illinois Contractors Machinery, Inc., Elmhurst, Ill.; Hutton Machinery Co., Marion, Ill.,

and Jeff City Diesel, Inc., Jefferson City, Mo., report high interest. Unit has heaped capacity of 29 cu. yds., faster speed 31.7 mph, 2-speed steer, and two Full-pak scrapers can be operated with one prime mover.

SAMUEL Krause Co., St. Louis, is using International T-430 crawler with Drott 4-in-1 bucket to push shot rock from an

11½-ft. sewer, 50 ft. below surface, tunnel under construction in St. Louis. By Missouri-Illinois Tractor, Hazelwood, Mo.

New Clark Office

Appointment of William A. Roever as manager of the newly created Dallas District Office has been announced by George W. Probst, Vice-President-Sales, Clark Bros. Co.

V-Band Couplings Brochure

A new 4 page brochure is available with complete design information on V-band couplings for connecting and sealing all types of tubing, piping, ducts, containers or structural devices for both aircraft or industrial applications. Coupling sizes can be obtained in any increment from the minimum diameter of the particular coupling to the maximum diameter of the application. For your free copy, write: Aeroquip Corp., Marman Division, 11214 Exposition Boulevard, Los Angeles, Calif. **(ITS NEW)**

New Manifold Valve

A new type compact and leakproof manifold valve, containing three valves in one unit, is now available from Circle Seal Products Co. The P-727 is designed for use with differential-type measuring, recording or transmitting instruments in chemical plants, refineries, pilot plants, test labs and research labs. Absence of cross-port leakage in the P-727 is said to eliminate a major cause of inaccurate instrument readings. One variation of the P-727 provides a bleed hole that vents both instrument ports to atmosphere when the balancing valve is open. Another variation is available which replaces the basic five valve assembly. Made of brass and 303 stainless steel, with operating pressures from 0-2000 psi, the P-727 is suitable for use in systems containing air, alcohol, ammonia, argon, helium, hydrogen, hydrocarbons, base oils, natural gas, nitrogen, etc. For more information write Circle Seal Products Co., Inc., 2181 E. Foothill Blvd., Pasadena, Calif. **(ITS NEW)**

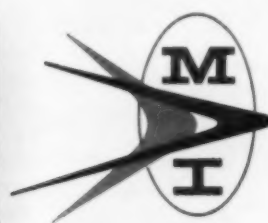
Turbine Starter Order

A contract for 100 air turbine starters for the Convair 600 aircraft has been received by The Garrett Corp.'s AiResearch Manufacturing division, Phoenix, Ariz. AiResearch low pressure model ATS100 starters were chosen by the San Diego division of General Dynamics for its latest commercial aircraft. Scheduled for delivery, early in 1961, the 600 is a larger, near sonic speed version of Convair's 880. Convair had previously ordered similar AiResearch starters for its 880 jetliner, which recently passed final flight testing for airline delivery.

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and Canada from a single source: Chrysler M & I.

Parts and service for both—marine or industrial, gasoline or diesel—available within 8 hours from Chrysler's nationwide Engine Center network.

What's new? The power, the package, the price! New Chrysler M & I line includes nine basic models—170 to 413 cu. inch displacement, two OHV sixes, seven OHV V-8's. Most are available in two versions—a heavy duty standard and a heavy duty premium—to give your application the exact power it needs. All are highly competitive engines that give you more heavy duty horsepower per dollar.

Perkins diesels are highly compatible with

Chrysler's horsepower range—and just as competitive. Six basic models—three, four and six cylinders—20 to 130 horsepower. All high speed, liquid cooled engines with a proven record of performance in over 500 applications—including Chrysler built trucks and taxis.

If your power requirements are within the 170 to 413 cu. inch range, you'll want to take a good long look at the new power package from Chrysler M & I. *Send Coupon for Details.*

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MARINE AND INDUSTRIAL ENGINE DIVISION

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Specification Folder

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(Horsepower) (Application)

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TITLE OR DEPT. _____

COMPANY _____

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CITY _____ ZONE _____ STATE _____

New AiResearch Turbocharger

Expansion of activity in the area of diesel engines with very high response rate is announced by The Garrett Corp.'s AiResearch Industrial Division, through development of its model T-18 tur-



Details on AiResearch's T-18 turbocharger are explained by John Cazier (left), senior project engineer, to Wolfgang Schlegel, of Garrett Corp.'s Chicago sales office.

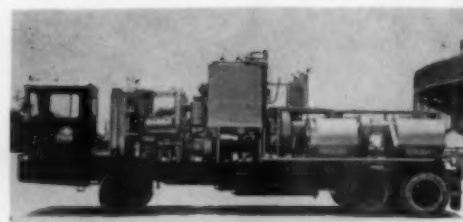
bocharger. The low inertia T-18 is designed for diesel plants in the 220 to 500 hp range, which are coming into prominence in the trucking and earth moving fields. With a housing diameter of

10.4 in. and a weight of 43 pounds, the turbocharger is considered quite compact for its capability. To meet a broad variety of applications, this new model has been evolved in two basic types. One provides a maximum of flow range for controlled turbocharger applications. The other gives a maximum of efficiency for free-floating applications. As an improved AiResearch product, the T-18 is said to present a combination of more rapid response, higher pressure ratios, improved durability, and continued high efficiency. Use of a star design turbine wheel is greatly responsible for reduced inertia and quick response. In this design, the turbine blades extend from a small diameter hub without a heavy back shroud. AiResearch engineers have designed this star wheel with unusually low stress levels.

ITS NEW

Oil Well Cementing Unit

Seven hundred brake horsepower that is controlled from a single location with finger tip control features an oil well cementing unit delivered by Stewart & Stevenson Services, Inc. to the Mike Hicks Tools and Cementing Co. of Houston and Crowley, La. The unit is one of the "Fieldmaster" line and was built from the ground up by Stewart & Stevenson. The chassis has an 18,000 lb. front axle, 34,000 lb. capacity bogie and features a specially designed one-man cab. The Hicks cementer is equipped with two General Motors diesel engines, series 8V-71, mounted side by side immediately behind the cab. The left, or road, engine drives through an Allison torque converter and



through an Allison power shift transmission which drives the vehicle and also drives one of the cementing pumps. The other engine drives through a Fuller 10 speed mechanical transmission which drives through a Stewart & Stevenson torque arm drive into the other cementing pump. Both cementing pumps are Gardner Denver model PA8-R triplex pumps with 4 in. plungers and special valves and seats for high pressure cementing service. When on an oil well cementing job, the unit is operated from a remote control console located on the operator's deck adjacent to the displacement tank. The operator can control both engines and both transmissions as well as all of the suction and discharge manifolding for the pumps from this centralized location. All of the transmission and engine controls located in the special one-man cab are remote controlled through air and hydraulically operated remote control systems. Each 8V-71 engine is rated at 350 bhp output for use in oil well servicing applications. The pumps will produce approximately two barrels per minute at 10,000 lbs./sq. in.; four barrels per minute at 5000 psi; eight barrels per minute at 2500 psi, and 16 barrels per minute at 1250 psi.

WHEN THIS NEW, MORE POWERFUL DIESEL HITS THE RAILS
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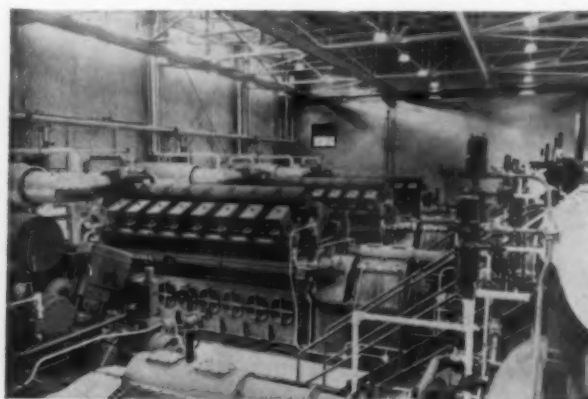


BRIGGS GOES WITH IT!



OIL FILTERS
FILTER-SEPARATORS
HYDRAULIC FILTERS

THE BRIGGS FILTRATION COMPANY
WASHINGTON 16, D.C.



**NORDBERG DIESELS AND KITTELL
SILENCERS...An efficient power team!**

Kittell's unique louvred design stops damaging back surge. As exhaust gases enter the silencer they are instantly bled off by a special perforated tube, then directed through louvres along the outer shell which cools them and reduces their volume. More louvres guide them back into the center of the silencer and then out into the atmosphere. This efficient design smooths pulsations, produces a whisper-quiet, exhaust flow. Available in a variety of sizes and designs for every noise application. Write for catalog.



Kittell

KITTELL MUFFLER and ENGINEERING, 1977 Blake Ave., Los Angeles, Calif.
17 years of experience in SILENCE!

Pittsburgh District Manager



W. O. Wright

William O. Wright, formerly Diesel Department Manager at Chicago branch of Fairbanks, Morse was recently made district manager of the Pittsburgh, Pa., office of the company. In his new capacity, Mr. Wright will head the Fairbanks, Morse organization for the sale of

all of its products in southwestern Pennsylvania and parts of West Virginia and Maryland. He started to work for Fairbanks, Morse in 1940 as a technical assistant in the Chicago Branch. After World War II army duty, he returned to Fairbanks, Morse and in 1947 was assigned as a field engineer selling diesel engines in northern Illinois and Iowa. Later that year, he transferred to the Michigan territory and in 1951 returned to Chicago as Diesel Department Manager.

Purchase 40 Tractors

Delivery has been completed on 40 International trucks purchased by Bruce Freight Lines, Inc., it was announced by President E. W. Harlan. Cost of the Internationals is more than \$500,000. They were purchased as part of Bruce's fleet modernization and expansion program in which a total of \$2,787,000 was invested last year. Twenty seven of the new trucks, including the ten being delivered, are diesel-equipped International model DCOF-405 six-wheel highway tractors. Rated at 79,000



pounds gross combination weight, these 152-inch tractors are equipped with 220 hp Cummins diesel engines and ten-speed RoadRanger transmissions. They will be used to pull 40 ft. high-cube trailers on regular Bruce routes between Des Moines, St. Louis, Kansas City, Minneapolis and Chicago.

Install Communications Network

Cummins Engine Co. was linked with 48 of its headquarter distributorships and 15 regional offices of the U. S. and Canada with opening of the company's new high speed communications system. The system, incorporates ultra-modern developments in automatic teletypewriter transmission, including transmission of form-written parts orders. Messages can be sent from any of the 64 terminal points to any location in the network. System capacity is 135,000 words per day or equivalent to about 650,000 messages per year. Parts orders can be received at the rate of one line item each four seconds, on each of three separate circuits. The 9,000 mile network extends coast to coast connecting 51 cities in the U. S. and Canada. The system was formally opened on April 1 by C. R. Boll, Cummins Vice President-Sales. According to Mr. Boll, the communications system will provide customers with the advantages of

rapid emergency parts order service. The network will also provide for immediate distribution of the latest service and maintenance techniques and will accelerate product improvements as a result of direct and continual field observation reports from sites of Cummins-powered equipment in operation. "In effect," says Mr. Boll, "the communications system literally moves distributors and Cummins users next door to the factory!" The communications system is also integrated into the Cummins data processing system. Incoming parts orders on punched paper tape are converted automatically into data processing cards, thus avoiding all hand processing up to the actual removal of parts from warehouse bins. According to Boll, this procedure will eliminate up to four days from the present processing time.



C. R. Boll (right), vice president-sales and R. D. Hicks, director-parts sales, send first message on new high-speed communications system to Cummins distributors, regional and divisional offices throughout U.S. and Canada.

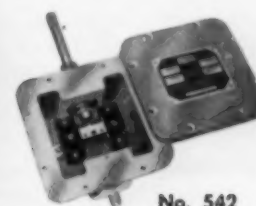
When everything's under control,
Robertshaw's always on hand!



No. 1150

Indicating Pneumatic Controller (For Temperature or Pressure)

Designed as controller, transmitter, or receiver-controller, this unit features proportional action (0.5% to 200%) and fully compensated thermal system, with automatic reset optional. Easily installed and serviced. Temperature ranges from -30 to +450°F. Pressure ranges 0-20 psi., 3-15 psi., 0-150 psi. Bulletin 57



No. 542

Temperature/Pressure Explosion-Proof Switch

Sounds alarm, flashes warning light, or stops engine if oil pressure drops or cooling water temperature reaches danger point. UL-approved for Class I, Group D installations where atmospheres are hazardous. Integral bulb type. Fail-safe thermal element. Catalog H



No. 530

Temperature/Pressure Shut-Down Unit

Fuel shut-off valve kills engines immediately if jacket water temperature exceeds safe limit, or lube oil pressure drops too low. Self-powered alarm optional. May be used to pilot larger pressure-operated valves. Catalog H



1280

Cooling Regulators

All-in-one control for lube oil or cooling water. Responds instantly to temperature changes; automatically operates to maintain exact temperature for best performance. Valve sizes 2" through 6". Catalog H



1281



No. 1084
Diaphragm
Control
Valve

Actuated by 3-15# signal from No. 1150 or other controller. Sizes 1/4" to 4"; single-seated, double-seated and three-way valves. Selection of body and trim materials. Bulletin TP-126.



No. 98901-A

Fuel Gas Valve

Diaphragm actuator stops engines by cutting off fuel supply and venting fuel system. Prevents damage due to low lube pressure, high jacket water temperature or over-speed. Used with No. 530. Bulletin TP-126

Designed for all types of internal combustion engines, Robertshaw controls help guarantee top efficiency with less maintenance . . . and at lower cost. Our one-source responsibility combines research and manufacturing, with field engineering assistance across the nation. When "everything's under control" . . . Robertshaw's well represented!

Robertshaw

Robertshaw-Fulton Controls Co.

FULTON SYLPHON DIVISION, KNOXVILLE 1, TENNESSEE



Filter Replacement Pack

Development of a new low cost oil filter replacement pack has just been announced by Luber-finer, Inc. Designated the regular Dieselpak, it has been designed for diesel truck operators whose maintenance schedules call for frequent oil and pack changes and who can not use the Company's Imperial cartridge. The new regular Dieselpak is smaller in diameter and contains less patented media than the Imperial. This, plus economies in design and a new field tested laminated cellulose canister, make possible low initial cost. According to Luber-finer, under normal over-the-road diesel truck operation the new regular Dieselpak will give 4,000 to 7,000 miles of filtration. The regular unit is available only in 750 size now, but sizes will be available to fit other Luber-finer units in the near future.

ITS NEW

Maintenance Meeting

The annual meeting of the Locomotive Maintenance Officers Association will be held in Chicago, Ill. on Sept. 12, 13 and 14. F. B. Rykoskey, general superintendent, motive power and equipment of the Baltimore and Ohio Railroad, will make the opening address at the meeting. Association members will tour the A.A.R. research laboratory and the Electro-Motive Division plant at La-Grange. R. D. Pfahler, assistant director of the Bureau of Safety, Interstate Commerce Commission, will be the speaker on Sept. 13.

Plan Equipment Show

Koehring Co. has announced plans for a 4-day construction equipment show to be held in September at the Company's proving grounds near Waukesha, Wis. All of Koehring's construction equipment divisions, subsidiaries, and branches will have exhibits at the show, which will be held in two flights, September 19 and 20, and 22 and 23. Available for inspection will be machines for road rolling and compaction, concrete paving and finishing, aggregate spreading, concrete batching and mixing, excavating and loading, hauling, material handling, trenching and backfilling, and drilling and boring.

Turbines Power Flying TV

Small gas turbines will power television beamed to five-million mid-west students from the world's first flying classroom this fall. The programs will originate from Purdue University, Lafayette, Indiana, transmitted from a specially equipped DC-6 orbiting overhead. Equipment for the unique program, extending the range of television transmission from about 50 to 200 miles, is designed and built by Westinghouse Air Arm division, Baltimore. The develop-

ment is financed by a Ford Foundation grant. Helping to make the project workable is the availability of reliable, light-weight power generation equipment. Two small gas turbine engines, built by the AiResearch Manufacturing division of The Garrett Corp., Phoenix, Ariz., will be used. Each operates a special 120 kw Westinghouse generator, powering two TV transmitters aboard.

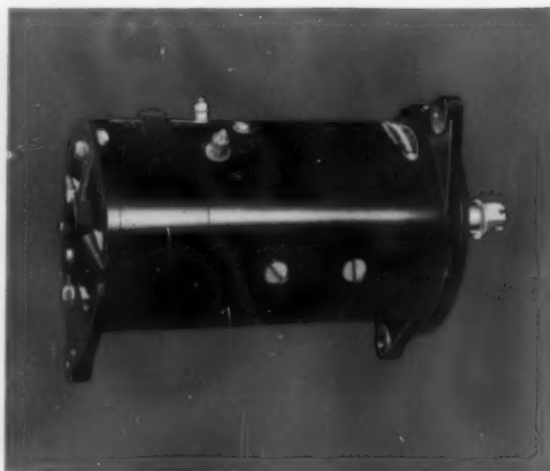
New Telemetry Bulletin

The Bristol Co. has released a new 52-page bulletin, M1715, which describes Bristol Metameter Telemeters. Contents of the bulletin include principles of operation; types of Bristol telemeters; application to various measurands, including pressure, water level, temperature, flow, motion, and position; and

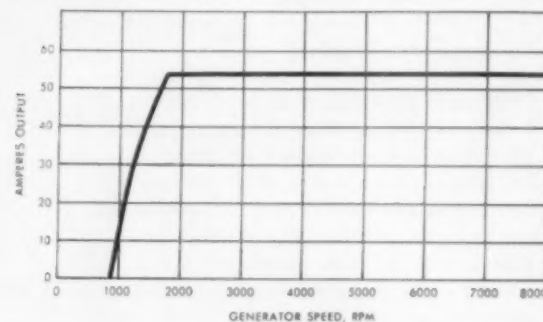
electrical quantities. Applications in various industries and utilities illustrated include gas distribution and transmission, oil transmission, and water distribution. Computer control, pump control, remote control, selective calling, and Metaphone are also illustrated. The bulletin is available on request from The Bristol Co., Waterbury 20, Conn.

ITS NEW

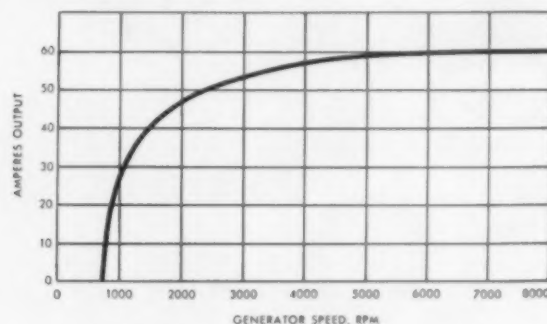
TAILOR YOUR TRUCKS



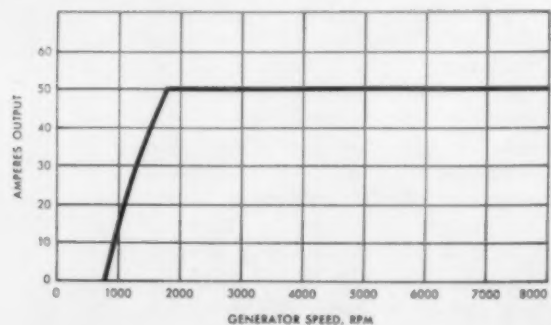
1106991 EXTRA-OUTPUT D.C. GENERATOR—12 volts • 55 amperes • 12 amperes at idle—For cross-country trucks, school buses and other vehicles with extra electrical equipment.



1117070 SELF-RECTIFYING A.C. GENERATOR—12 volts • 60 amperes • 27 amperes at idle—For high-duty vehicles with heavy electrical loads . . . operating at all speed ranges. Ideal for excessive low-speed operation and curb-idling.



1106985 EXTRA-OUTPUT D.C. GENERATOR—12 volts • 50 amperes • 14 amperes at idle—Short frame generator for difficult mounting applications. For vehicles in city and suburban use. Not for cross-country operation.



DIESEL AND GAS ENGINE PROGRESS

Sales Engineer

Ralph H. Vance, Jr., has been appointed a sales engineer by Dayton Industrial Products Company. He will handle the company's line of industrial V-Belts, sheaves, industrial hose and related items in the Cincinnati, Ohio, sales region. Mr. Vance was previously an application engineer with Allis Chal-

mers Co., Cincinnati. He is a graduate of Miami University, Oxford, Ohio.

White Regional Officers

White Motor Company has elected three new regional vice presidents, all representing promotions from regional managerial positions, it has been announced by J. N. Bauman, president of

the Cleveland heavy-duty truck manufacturer. Charles S. Hale was elected regional vice president of the North Atlantic region and Edward S. Hoke regional vice president of the Eastern region. Hale and Hoke have been in charge of the regions as regional managers the past two years. Robert F. Sharpe, Southern region manager, was elected regional vice president.

Bonded Parts Program

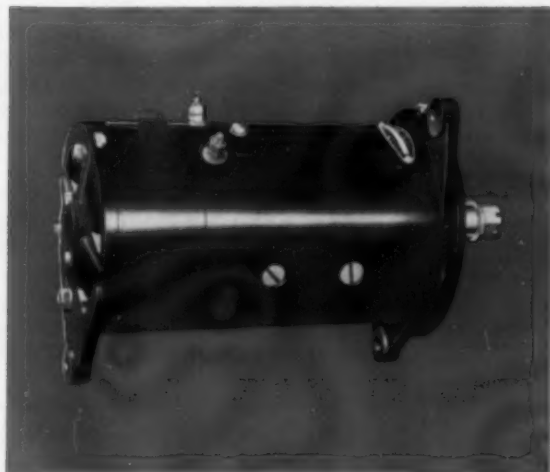
Guaranteed rebuilt parts assemblies are now available from Caterpillar dealers in the United States and Canada under a "Bonded Buy Parts Assembly" program just announced by Caterpillar Tractor Co. The bond, issued by Lumberman's Mutual Insurance Co., guarantees a rebuilt exchange assembly up to a \$5,000 cost. Only a few units in the assembly exchange program, such as complete diesel engines, would come to that price. Under the assembly exchange program, customers "trade-in" defective or worn units for a rebuilt assembly. These items range from turbo-chargers to flywheel clutches to complete track-type tractor undercarriages. The customer is charged on the basis of parts and labor necessary to rebuild his trade-in to good-as-new condition. A similar bonding program was adopted by Caterpillar in recent years for used equipment sold by the company's dealer organization. The rebuilt assembly exchange program is a fairly recent development in the heavy equipment industry. It has been proven an effective means of reducing overall machine repair costs by getting "down" equipment back into productive work in a short time. The time savings results from not attempting to repair the defective component at that time for that particular machine. A copy of the bond is to be issued for each parts assembly sold under the guarantee program, and each assembly will be tagged as being bonded.

New Impactool

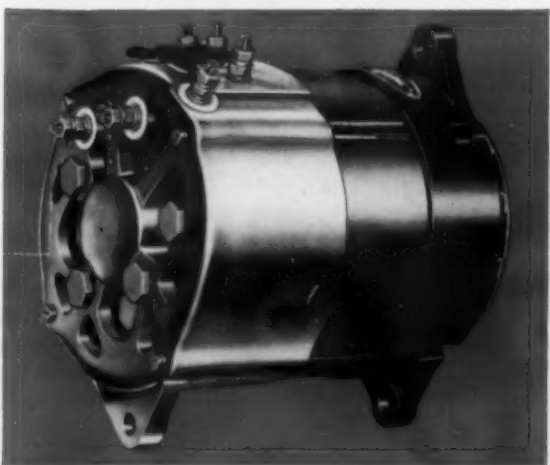
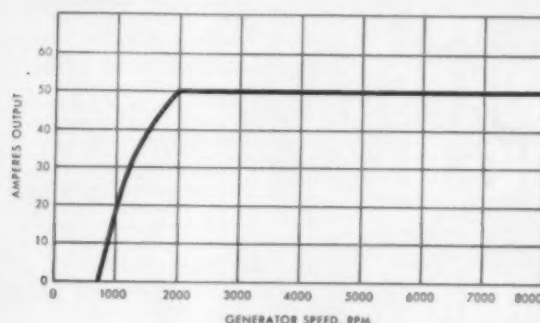
A new Ingersoll-Rand air operated Impactool features 20 percent more power and 200 percent faster rundown. Designed for hard industrial service, the size 808 Impactool will handle work up to $\frac{5}{8}$ in. bolt size. The 808 Impactool is $2\frac{1}{4}$ in. shorter than the tool it supersedes. This new tool is $7\frac{1}{4}$ in. long, with a side to center distance of $1\frac{1}{2}$ in., and weighs only $8\frac{3}{8}$ lbs. It delivers 1100 impacts per minute, and has a free speed of 6000 rpm. The standard square driver of the tool measures $\frac{5}{8}$ in. across flats; $\frac{3}{4}$ in. and $\frac{1}{2}$ in. square drivers are also available. For further information contact Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y., requesting Form 5279. **ITS NEW**

READY NOW! The completely new 1960 edition of the **DIESEL AND GAS ENGINE CATALOG**, Volume 25, can now be purchased. If you design, purchase, sell, operate or service diesel, dual fuel, or gas engines, the Catalog is essential to you and your business. This giant, 442 page, $10\frac{1}{2} \times 13\frac{1}{2}$ in., fully illustrated reference book has been rewritten, revised and brought up to date completely from cover to cover. Send your order in now for this limited edition, which costs just \$10 post-paid anywhere in the world. Send checks, money orders or company orders to **DIESEL AND GAS ENGINE CATALOG**, 9110 Sunset Blvd., Los Angeles 46, Calif.

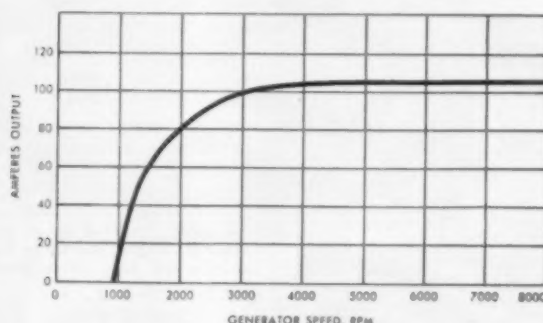
TO JOB CONDITIONS



1106986 EXTRA-OUTPUT D.C. GENERATOR—12 volts • 50 amperes • 20 amperes at idle—For metropolitan trucks and school buses, with extra electrical equipment . . . operating at low speeds and with engine idling most of the time.



1117115 SELF-RECTIFYING A.C. GENERATOR—12 volts • 105 amperes • 10 amperes at idle—For high-duty vehicles with extra-heavy electrical loads . . . operating at all speeds. A.C. voltage available for 110 V conversion.



Delco-Remy offers a complete line of D.C. and A.C.-D.C. generators that are right for the job.

Demands on the electrical systems of trucks vary with their use. For best performance, whether the vehicles be new or already in service, the electrical equipment should be job-matched to meet those demands.

Do your trucks have extra electrical equipment? Operate cross-country, around town or off the road? Do they travel at sustained highway speeds, or with plenty of

stop and go? Whatever their assignment, there are Delco-Remy extra-output generators and regulators job-matched to meet the electric power needs *exactly*.

Delco-Remy ELECTRICAL SYSTEMS



FROM THE HIGHWAY TO THE STARS
DIVISION OF GENERAL MOTORS • ANDERSON, INDIANA

Inland River Reports

By A. D. Burroughs

REAGEN Equipment Co., New Orleans, supplied two Waukesha Wanderer 315 hp marine diesel engines for the new 65 ft. tug in the crude oil trade for Bollinger Towing Co. Named the *Bud Bollinger*, the craft was constructed by Bol-

linger Shipyard and Machine Shop, Lockport, La.

O. L. FURSE, a new 33.5 x 12.2 ft. oil exploration craft, is in service for Humble Oil and Refining Co., Houston. Built by Breaux's Bay Craft, Inc., the vessel has power delivered by two GM (Detroit) model 3071 engines, rated 95 hp each at 1800 rpm.

SEWART Seacraft, Inc., La., delivered another new oil exploration craft to Humble, with GM (Detroit) engines, model 4071, rated 100 hp at 1800 rpm, supplied by George Engine Co., Harvey, La. The craft was christened O. L. Rollins.

THE new *Joe Lucas* is busy on the Ohio River working for Ohio River Sand &

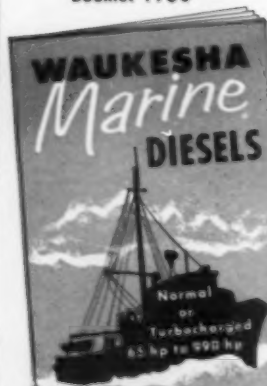
Gravel Corp., Parkersburg, with power from twin Caterpillar model 353 engines for the rated 600 hp.

THE new 64 ft. excursion vessel, built by Calship, Inc., Sulphur, La., for Louisiana Cruises, Inc., is in action in the tourist trade excursion trade in the New Orleans area. Two 6-71 GM engines provide propulsion power.

17 POWER-FULL reasons why it's WAUKESHA DIESELS for WORK!



Write for Booklet 1760



Engine	Type	Cyls.	Bore & Str.	Displ.	24-Hr. Max. Rating
RELIANCE	Normal	12	8 1/2 x 8 1/2	5788	725 hp @ 1215 rpm
	Turbo	12	8 1/2 x 8 1/2	5788	990 hp @ 1215 rpm
DEFENDER	Normal	6	8 1/2 x 8 1/2	2894	335 hp @ 1215 rpm
	Turbo	6	8 1/2 x 8 1/2	2894	510 hp @ 1215 rpm
WANDERER	Normal	6	7 x 8 1/4	1905	240 hp @ 1215 rpm
	Turbo	6	7 x 8 1/4	1905	315 hp @ 1215 rpm
RESOLUTE	Normal	6	6 1/2 x 6 1/2	1197	195 hp @ 1600 rpm
	Turbo	6	6 1/2 x 6 1/2	1197	290 hp @ 1600 rpm
VIGILANT	Normal	6	5 1/4 x 6	779	130 hp @ 1800 rpm
	Turbo	6	5 1/4 x 6	779	195 hp @ 1800 rpm
CUTWATER	Normal	6	4 1/4 x 5	426	100 hp @ 2000 rpm
	Turbo	6	4 1/4 x 5	426	120 hp @ 2000 rpm
NAVIGATOR	Normal	6	4 x 4	302	65 hp @ 2000 rpm
	Turbo	6	4 x 4	302	85 hp @ 2000 rpm

CRANKCASES Waukesha special alloy cast iron. Heavy main bearing bridges and thick oil pan mounting flanges and end walls—designed for maximum rigidity.

CYLINDER HEADS Valve-in-head high compression type. Clean-burning, controlled turbulence, patented spherical combustion chambers. Injection nozzles and combustion chambers removable from the outside.

CYLINDERS Removable wet sleeves of Waukesha special heat-resistant alloy iron in all engines except Cutwater and Navigator. Cutwater and Navigator have dry sleeves.

PISTONS Heavy-duty aluminum alloy with wedge-type compression rings. Oil control rings are parallel-side type. Pistons ribbed for extra strength; designed for even heat expansion.

CONNECTING RODS Forged steel, rifle-drilled for pressure oiling to pin bearings. Both ends precision-machined on parallel centers to Waukesha Quality Control standards. Pistons and pins assembled in matched sets.

CRANKSHAFTS Forged steel shafts are machined and precision ground in Waukesha's shops to rigid Quality Control standards. All crankshafts carefully balanced, with large diameter journals, for smooth power flow through entire power train to shaft and propeller.

MAIN and ROD BEARINGS Precision-type replaceable steel-backed bearing shells held by deep-section caps. Unusually large total bearing areas.

EXHAUST MANIFOLDS Water-cooled exhaust manifolds on all models.

GOVERNORS Automatically lubricated, mounted on injection pumps in all models, except the Defender and Reliance which use governors driven from the engine gear train.

FUEL SYSTEMS All Waukesha Marine Diesels equipped with Bosch injection pumps (except the Navigator which has the Roosa-Master pump), drawn steel injection lines and pintle-type injection nozzles. Combustion chamber assemblies removable from the outside.

LUBRICATING SYSTEMS Positive pressure gear-driven lubricating pumps and scavenger pumps. Pressure relief valves. Oil filters and coolers.

COOLING SYSTEMS Centrifugal pump cooling. Directed circulation, and coolant passage design eliminate hot spots and promote even heat control. Expansion tanks for all models. Engines engineered for either heat exchanger or keel cooling.

STARTING SYSTEMS Electric systems with starting motors, generators and regulators, available for all models. Air or hydraulic starting available.

POWER TAKE-OFF Front end power take-off for driving hydraulic pumps, auxiliary generators or air compressors, raw water and bilge pumps, winches and other marine accessories (except on Navigator Series).

REVERSE and REDUCTION GEARS Reverse and reduction gears in size and ratios to match all Waukesha marine engines and the service requirements.

CONTROLS and INSTRUMENTS Oil Pressure and water temperature gauges, starter switches, safety devices, instrument panels, and tachometer drives. Visible and audible alarms or facilities therefor, as specified.

OTHER ACCESSORIES and EQUIPMENT are available for special services.

LAUNCHING ceremonies were held by Superior Boat Works, Greenville, Miss., for the new towboat, *Pioneer*. The 51 x 18 ft. vessel is equipped with three GM 6-71's.

MASTER PAT, a recent production from Missouri Valley Steel, Inc., was spotted performing for owner John F. Beasley Construction Co., Muskogee, Oklahoma. The tiny 35 x 10 ft. craft has a reported 200 hp.

MISSOURI Valley Steel, Inc., Leavenworth, Kansas, handled the repowering job on the *George Peterson*. The 30-year-old craft, operated by Massman Construction Co., Kansas City, Mo., is equipped with a Cummins VT-12-M diesel engine for a rated 400 hp.

THE *Nebraska*, operated by Cunningham Kiewitt Co., Omaha, has been repowered with a pair of new GM (Detroit) 12V-71's, giving a power boost to 770 hp. Missouri Valley Steel, Inc., handled the installation.

FAIRBANKS-Morse OP engines were used to repower the 100 x 25 ft. tug, *Norwalk*, operated by Red Star Towing and Transportation Co. Ira A. Bushey and Sons, Inc., Brooklyn, N.Y. managed the installation giving the craft a rated 1800 hp.

DRAVO'S often-sighted *Keystone* carries a new flag and a new name, the *Frank R. Alter*. Purchased by Alter Co., Davenport, Iowa, the 145 x 27 ft. towboat is equipped with Cooper-Bessemer engines.

COTTON Queen, 124 x 27 ft. towboat, with 1800 hp supplied by GM engines, is serving new owners, The Tennessee Towing Co. The craft was formerly the *Winchester*, of the Ashland Oil fleet.

ON the water, busy in the coal trade on the upper Ohio was the *Coal Queen*, with 364 hp delivered from a pair of Caterpillar engines. The 50 x 15 ft. craft is operated by Capt. Dick Bissell.

THE two-year-old towboat *Humphrey* was another busy performer in the Ohio River coal trade, performing with 1800 hp from two White Motor Company Superior engines. The 132 x 27 ft. craft was completed by Dravo for Consolidation Coal Co., in 1958.

WAUKESHA MOTOR COMPANY, WAUKESHA, WISCONSIN / New York • Tulsa • Los Angeles
Factories: Waukesha, Wisconsin and Clinton, Iowa

Improved Marine Battery

Marine batteries that are 50 per cent more powerful than their equivalent-size predecessors, yet carry a lower price tag for ampere-hours delivered, are described in new bulletins offered by Exide. The new batteries, called MGD, can provide the same or more electrical capacity, where compartment area is at a premium, in 27 per cent less space. Photos, charts and line drawings serve to underscore design features of the batteries, which also are 13 per cent lighter in weight than existing models of similar capacity. Principal design innovation—detailed in cutaway photos is modification of Exide's tubular positive plate construction through the use of new, continuous-filament glass fibre, braided into tubing and encased in plastic armor. This passes electrolyte freely, but retains active material without shedding. Typical marine applications noted include diesel engine starting, emergency lighting, and powering of radio equipment, watertight doors and other electrical loads on craft from workboat size to ocean liners. For copies, write Exide Industrial Division, The Electric Storage Battery Co., Rising Sun and Adams Aves., Philadelphia 20, Pa. Ask for Forms 6270 and 6275.

(ITS NEW)

Euclid General Manager

Appointment of V. L. Snow as General Manager of Euclid Division of General Motors Corp. has been announced. Mr. Snow succeeds R. Q. Armington who has resigned in order to devote full time to his family manufacturing interests. Mr. Snow joined The Euclid Road Machinery Co. in 1935 as a member of the Engineering Design Department and was made Director of Engineering in 1958. Mr. Armington has been associated with Euclid since 1931. He served as general manager of the company until 1951 when he became president. When The Euclid Road Machinery Co. became a division of General Motors, Mr. Armington was appointed general manager of the new division.

Clark Turbine-Compressors For Trans-Canada Pipe Line

Clark Bros. Co., has announced the sale by Clark Compressor Co. Ltd., Calgary, Alberta, a Dresser subsidiary in Canada, of three gas turbine centrifugal compressor sets to Trans-Canada Pipe Lines Limited, as part of the latter's multi-million dollar expansion program to export natural gas to the United States. The turbines are Clark model 305 regenerative cycle, dual shaft machines rated at 8370 hp each (at NEMA conditions). They will drive Clark 30 in. by 30 in. single stage centrifugal pipeline compressors which will pump ap-

proximately 700-million cu. ft. of gas per day through one of the world's largest and longest pipelines. The turbine-compressor sets will be located in three new compressor stations (Nos. 5, 9 and 17) which are being added to the western portion of the Trans-Canada line running through the southern part of Saskatchewan. Startup of the new stations is scheduled for the Fall of 1960.

Sales Director

W. Wiggins has been named vice president and director of Sales of Power Incorporated of Fort Myers, Fla., southeast distributors of Mercedes-Benz diesel engines. Bill Wiggins comes to Power Incorporated with a sales background of over 20 years in the automotive and marine fields.

READY NOW! The completely new 1960 edition of the **DIESEL AND GAS ENGINE CATALOG**, Volume 25, can now be purchased. If you design, purchase, sell, operate or service diesel, dual fuel, or gas engines, the Catalog is essential to you and your business. This giant, 442 page, 10½ x 13½", fully illustrated reference book has been rewritten, revised and brought up to date completely from cover to cover and costs just \$10 postpaid anywhere in the world. Send checks, money orders or company orders to **DIESEL AND GAS ENGINE CATALOG**, 9110 Sunset Blvd., Los Angeles 46, Calif.



*the new
word for the
world-famed
leader in
replacement
packs*

IMPERIAL MODEL DIESELPACK®

Imperial DIESELPACK with exclusive filtering process, patented media and superior performance effectively removes solid and colloidal impurities from H.D. compounded oil for 7,000 to 12,000 miles of normal diesel truck operation. When you consider maintenance cost per mile, the Imperial model DIESELPACK is the most economical oil filter replacement pack you can use—regardless of price.

ALSO THE NEW REGULAR DIESELPACK®
...for maintenance schedules
calling for frequent oil and
pack changes (4,000-7,000 mile)
GENUINE DIESELPACK PROTECTION
LOW INITIAL COST



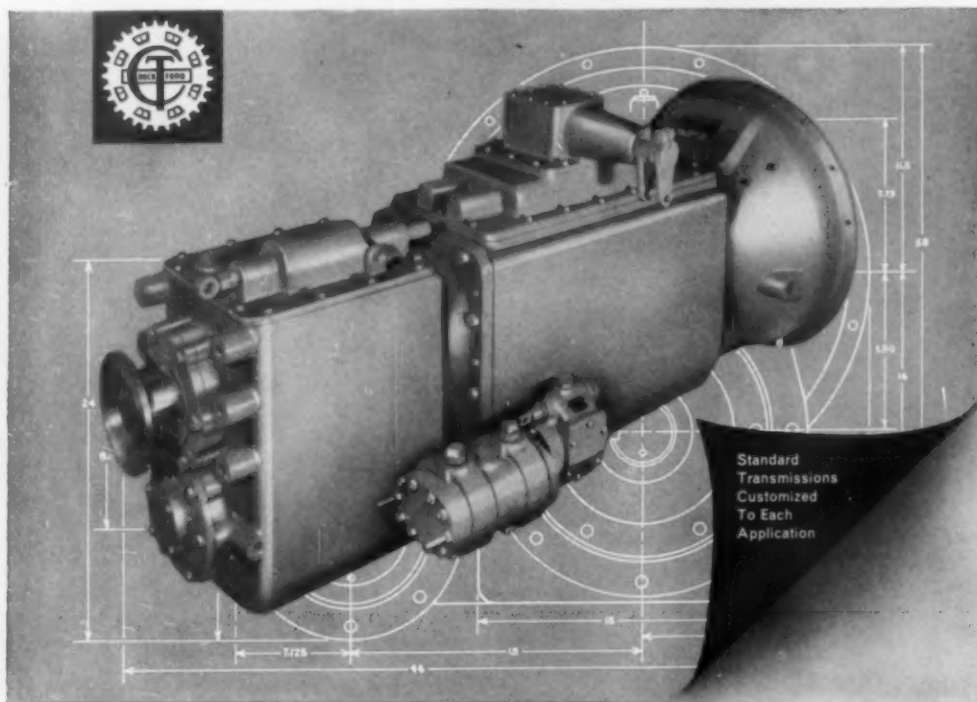
Luber-finer
INCORPORATED
2514 So. Grand Avenue, Los Angeles 7, California

32 Locomotives For Brazil

The Federal Railway Network of Brazil (Rede Ferroviaria Federal) has ordered 32 additional General Motors diesel-electric locomotives. Sixteen locomotives will be of 1425/1310 hp and 16 of 950/875 hp. The new order brings to 92 the number of locomotives; to be manufactured by GM's Electro-Motive Division at La Grange, Ill., for shipment to Brazil this year. After those deliveries are completed, a total of 291 General Motors diesel locomotives will be in operation in Brazil. The remaining 60 GM locomotives scheduled for delivery to Brazil in 1960 include 25 for E.F. Vitoria a Minas, 23 for Cia. Mogiana de Estrada de Ferro, and 12 for E. F. Araraquara.



Ninety-two General Motors diesel locomotives will be shipped to Brazil this year, including 32 recently ordered by the Federal Railway Network (Rede Ferroviaria Federal). Shown is part of an earlier GM shipment to RFF from New York.



Heavy-Duty Multiple-Speed Transmission

Cotta heavy-duty transmissions match high-speed engines to big-machine production

Balancing 2300 - 2400 rpm engines for best heavy equipment production is all in a day's work for Cotta heavy-duty transmissions. Why? Because Cotta transmissions are especially engineered to handle the severe shock loads common in today's big-machine operations.

Extra-wide gears absorb 150 - 2500 ft-lb input torque loads of drilling rigs, power shovels, rock crushers, and mining equipment. Large, multiple-spline connections on alloy steel shafts eliminate stress points and provide maximum concentricity of gears.

±.0005" tolerances aid efficiency

At least 400 - 500 inspections of each gearbox help maintain tolerances to ±.0005". That accuracy won't wear off — even after long,

tough use! Closely spaced gear ratios provide the variable speeds required on rigorous big-machine production. And, hand assembly of all Cotta transmissions provides the dependability and efficient performance that pumps, generators, locomotives, off-highway trucks, and similar equipment demand for long hours of trouble-free operation in the field.

Diagrams sent free on request

See our catalog in *Sweet's Product Design File*. Check the detailed descriptions and specifications on standard and custom applications. Then call Cotta (TWX-RK 7720 or phone WO 4-5671) for details on precision-built transmissions designed especially to handle *your* heavy-duty power problem.

COTTA

HEAVY-DUTY TRANSMISSIONS

COTTA TRANSMISSION CO., ROCKFORD, ILLINOIS



Pumping Locomotives Construction Drilling

2 New Canadian Ferries

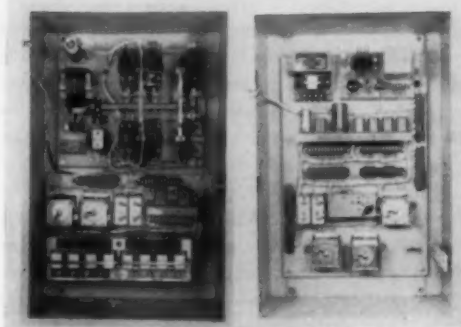
Commencement of full scale ferry service between Vancouver and southern Vancouver Island on June 15 is an important step forward in the commercial and tourist life of British Columbia. The broad, wind-whipped Gulf of Georgia divides British Columbia's island capitol from its largest city. Only comparatively large seaworthy vessels have been able to successfully span this open body of water in regular service. In 1958 the Provincial legislators found themselves completely dependent upon air travel for inter-city transportation, as a crippling strike had effectively eliminated the marine business from the scene. The decision was made on July 17, 1958 to implement this ferry service. To show the speed with which this project was undertaken after the July 17 date, Philip F. Spaulding and Associates of Seattle, Wash., were commissioned to prepare the contract plans and specifications for the new ferries and T. A. McLaren of Vancouver, B. C., was to act as the owner's representative. In less than 75 days, the contract plans and specifications were issued for world-wide competitive bidding. Victoria Machinery Depot Co., Ltd. from the award of contract on November 14, 1958, made something of a construction record, laying the keel March 9, 1959 and launching the *M/V Sidney* on October 6, 1959. Preliminary sea trials were held February 16 and 18, 1960, and she was delivered on March 2, 1960, less than a year after keel laying. Burrard Dry Dock Co., Ltd., laid the *M/V Tsawwassen's* keel on May 28, 1959 and launched her on November 28, 1959, just six months' time from keel laying. The *M/V Tsawwassen* ran her trials in March of 1960 and she was delivered on March 31, 1960. The twin sisters are single ended ferries and are both bow and stern loading. They have twin rudders and are propelled by twin five bladed propellers. The overall length of these vessels is 336 ft., extreme breadth is 74 ft. 1 1/4 in. and they have a 15 ft. 0 in. clearance on the car deck. The vessels' full load draft is 12 ft. 6 in. and depth of hull is 20 ft. 6 in. The vessels will accommodate on the average 125 automobiles and 475 passengers and displace 2880



M/V Tsawwassen as she passes under Lions Gate bridge at Vancouver.

tons. Main engines are two 16 cylinder Mirreles Model KVSSMK16, 4 cycle turbo supercharged engines with a 15 in. bore and an 18 in. stroke. The main engines develop 3,000 hp each at 330 rpm and gave a trial speed of 18 1/2 knots for each vessel. Accessories consist of Burgess-Manning silencers, Brown-Boveri turbochargers, Bryce fuel pumps, Sharples centrifuges, and Woodward governors.

Start-Stop Control System



Lumen, Incorporated, Joliet, Ill., has announced new design refinements in its automatic magnetically controlled start-stop system for electric power switching operations. Intended for use at unattended facilities, and installations requiring automatic switching, the unit monitors both primary and secondary power sources, performing all necessary switching to insure a continuity of power. The unit also performs anticipatory functions, monitoring for deterioration of primary service, and replacing with auxiliary power before the primary source experiences total failure. The start-stop control automatically starts a diesel generator set upon interruption of primary power. When the auxiliary system reaches the proper voltage and frequency value it blocks out the primary source, and transfers the load to the auxiliary system. The start-stop control group is designed for operation on 50-60 cycle ac power lines, either 3 phase 240 v 3 wire, or 120/208 v 4 wire. It is available in two power ratings, 15 kw or 30 kw. In addition, the basic unit can handle loads as high as 250 kw with only minor re-design. For more information write Lumen, Inc., Joliet, Ill. **ITS NEW**

Western Gear District Office



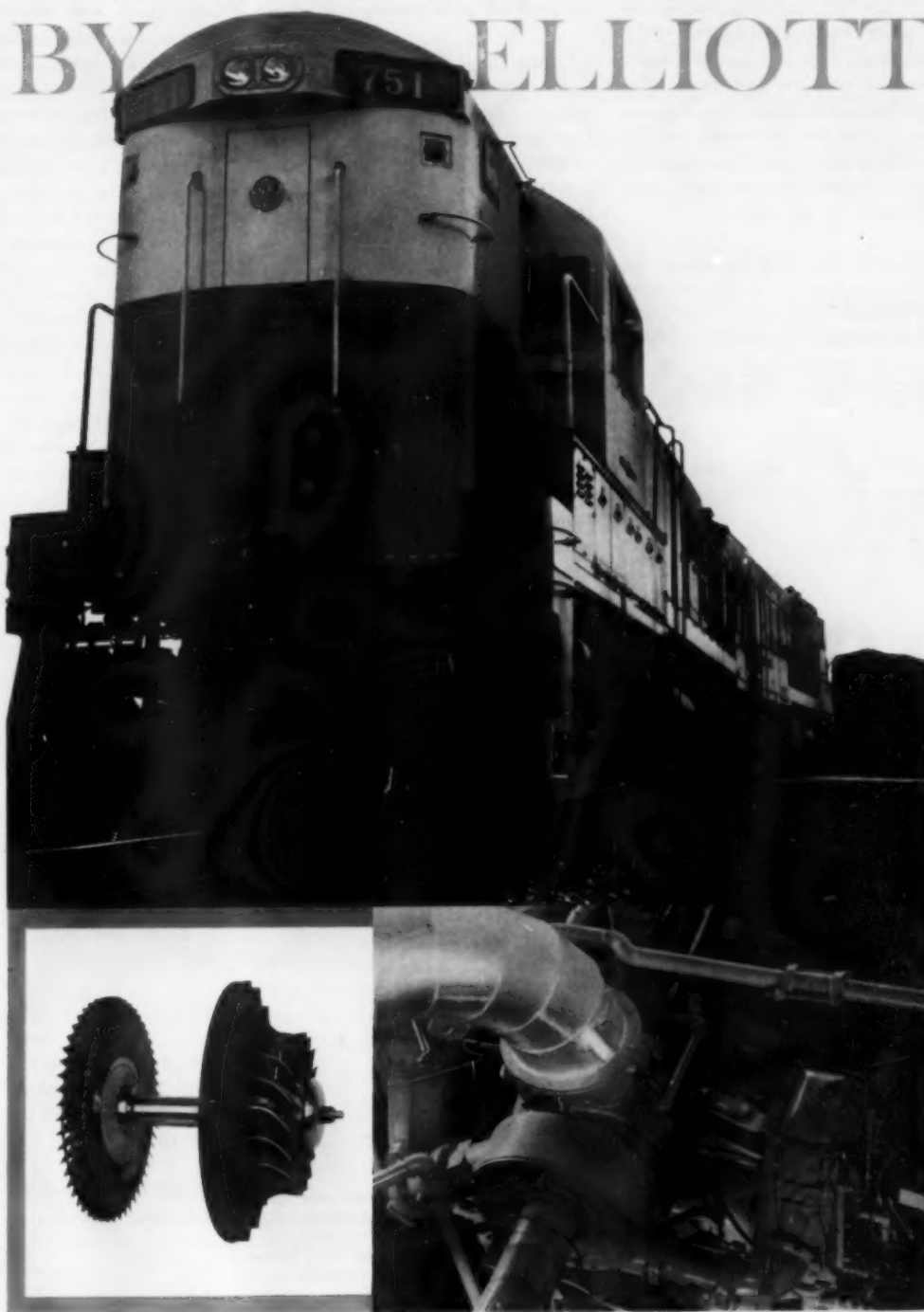
G. Jern

Western Gear Corporation announces the opening of a district office in Cleveland, Ohio to be located at 3109 Mayfield Road. Glenn Jern, a veteran of many years with Western Gear, has been appointed to manage the Cleveland office. He was previously district marketing manager of the Southwestern Division of Western Gear Corporation at Houston, Texas.

Turbine Cuts Snow Problem

A 27-man, four hour job of clearing snow from airport lights at Fairchild Air Force Base, Spokane, Wash., is now done in an hour-and-a-half by one man. Ingenuity and an Air Force MA-1A starter cart housing an AiResearch small gas turbine were teamed to set the record. Fairchild maintenance crews designed a nozzle and clamp to direct hot bleed air from the turbine at snow and ice covering runway lights. The hose, designed for pneumatic starting of any Air Force jet, is clamped at a 30 degree angle across the back of the cart. The cart is towed with the hose blast directed at the lights. Protected lights are cleared without removal of grates and lens breakage stopped.

TURBOCHARGED BY ELLIOTT



(Above) The heart of the turbocharger—the only moving part—is this sturdy, simple, precision-made rotor. Over 20 years of engineering and manufacturing experience has proved the soundness of Elliott turbochargers.

(Right) Elliott turbocharger on test with Cooper-Bessemer engine at the Erie Plant Engine Laboratory of General Electric Company.

A vital element of the new 2500-hp General Electric U25B diesel-electric locomotive is the high-pressure Elliott turbocharger. With a pressure ratio of $2\frac{1}{2}$ to 1, it makes possible the high horsepower output of the engine. Millions of miles of experience over a period of twenty years, have demonstrated the excellent performance and reliability of Elliott turbochargers.

ELLIOTT Company
SUPERCHARGER DEPARTMENT
JEANNETTE, PA.

MO-2

Florida Diesel News

By Ed Dennis

THE 92 ft. *Battler*, out of Port Everglades, powered its way clear of a bruising start, to take and keep the lead in the 6th Annual Maritime Day Tugboat Race at Miami. Powered with an 850 hp Cooper-Bessemer diesel, the 62-year-old youngster finished the two mile course in 12 minutes 12 seconds.

FLORIDA-Georgia Tractor, Miami, delivered to Scott Stanley & Sons of Hollywood, a model H90 Hough four wheel drive Payloader (tractor-shovel) with a Cummins JN6BI diesel rated 122 hp at 2200 rpm and Allison torque converter.

DOWN at South Miami Heights, David M. Woolin & Sons are developing a 5000 home housing project. Among the dieselized equipment are five Caterpillar

DW21 two wheel tractors and scrapers powered by 300 hp turbocharged Cat diesels. Four Cat D8 tractors (190 hp) are used for push loading and dozing.

AT Miami, the Detroit Diesel Div. GMC delivered a V8-71 marine diesel with 2:1 GM hydraulic r&r gears to Interamerica Export Co. for shipment to South America. They also repowered a WC22 White hiway tractor for John Hall with a model 4-53 rated 130 hp at 2800 rpm.

TWO 1250 kw Superior diesel generating sets to C. A. de Administration-y Fomento Electrico in Caracas, Venezuela. These are model 80-GDSX eight cylinder turbocharged dual fuel engines and will be installed in the El Tigre Plant.

NEAR Fort Pierce, the Minute Maid Groves have installed three D318 Caterpillar diesel pumping units, these 137

hp diesels power Couch 36 in. turbine 25,000 gpm pumps. The Company is draining about 6000 acres of swamps for citrus groves and will plant about 1/2-million trees. About a dozen pumping units will eventually be installed.

THE *Flow Along*, a fishing vessel owned by Ted Smits of Marathon, was repowered by a pair of Ford six cylinder model Y96 hp at 2250, diesel engines with Paragon 2:1 r&r gears. These were marined by Modern Diesel Power of Tampa.

AMONG the dieselized equipment the Lansing Rock Co. of Brooksville is using in their lime rock mining operations, is a Michigan 275-A four cubic yard tractor shovel. These 275-A machines are powered by Cummins NT06BI turbocharged diesels rated 262 hp at a governed rpm of 2100. The torque converter is Clark industrial type 3.0:1.

THE University of Miami exploration vessel *Explorer* had a Kohler dc 10 kw electric plant installed. The unit is powered by a Waukesha diesel engine and came from J. Frank Knorr & Co. of Miami.

THE Cooper and Leonard Construction Co. is using a model S12 Euclid hydraulic scraper (12 yd. cap.) that is powered with a G.M. 6-71 218 hp at 2100 rpm diesel engine, Fuller transmission and a Lipe-Rollway clutch. For push loading a Caterpillar D8, 190 hp dozer is being used. The new site is for a housing development northeast of Tampa.

MOBILE Service Center of Mobile, Alabama, installed a model OM636 Mercedes-Benz diesel with the regular four speed Mercedes-Benz transmission in a taxicab. This diesel is rated 36 hp at 3000 rpm.

AWAITING reshipment on Miami docks were three model PTDS8 Superior diesel engines. These eight cylinder 8 1/2 x 10 1/2 Superiors are rated 800 bhp at 900 rpm and are hooked up to Ideal Fluid drive drilling rig power units manufactured by National Supply.

LLEWELLYN Machinery of Tampa delivered to the Triton Construction Co., near Crystal River, a Hercules model DD339 six cylinder diesel rated 99 hp at 2000 rpm to power a 24 in. lo-lift M&W water pump.

THREE No. 360 Allis-Chalmers motor scrapers (15 yd.) powered with model TDS844 Allis-Chalmers 280 hp diesel engines are currently being used by the Fort Myers Construction Co. at Cape Coral. Allis-Chalmers HD16 (150 hp) and HD21 (225 hp turbocharged) crawler tractors are being used to push

load. The units came from Richardson Tractor Co. of Tampa.

A Continental model GD157 powered the Huber-Warco scraper that was delivered to Dade County Road Department. This four cylinder 3 3/8 x 4 3/8 diesel is rated 39 hp at 2000 rpm and has a Fuller 12T fluid drive.

INTERNATIONALS new TD25 crawler tractor was delivered to Herman Greer of Orlando. This new TD25 tractor is powered with a model D817 turbocharged direct starting International-Harvester diesel with 230 net engine hp.

FOR Balboa, C.Z. two DW21G tractors with 470 series B scrapers powered with 300 hp turbocharged Caterpillar diesels to Foster-Williams Bros. Construction. Also awaiting shipment to West Indies ports were three D7, one D4 and one D8 Caterpillar tractors.

CURRENTLY being used in the construction of several jet-plane run up pads, at Miami International Airport, is a Michigan No. 175-A tractor shovel powered with Cummins JT 162 hp diesel engine and a Clark torque converter.

Overseas Shipments

15 diesel engines totaling 20,800 hp have been shipped recently by General Motors Cleveland Diesel Engine Division to overseas customers. Eight engines totaling 12,800 bhp were shipped for installation in a Suez Canal Authority tug; four engines totaling 6,400 bhp will repower a Suez Canal Authority hopper dredge; two totaling 1,600 bhp will power an Orinoco Mining buoy vessel and a single engine of 1,600 bhp will be installed on a Dutch-built dredge.

New Distributors, Dealers

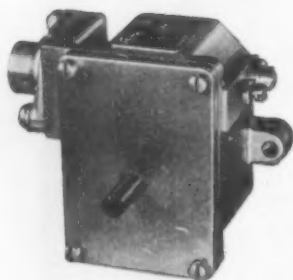
Lister-Blackstone, Inc., Long Island City, N. Y., has announced appointment of the following to handle their diesel engines: Distributors—Shelley Tractor & Equipment Co., Miami, Fla.; Lister Sales & Service, Great Bend, Kans.; and Andrews & Andrews Equipment Co., Portland, Ore. Dealers—Atlanta Equipment Co., Atlanta, Ga.; Michigan Generator Service, Detroit, Mich.; Engines, Inc., Chicago, Ill.; and Nelson Equipment Co., Tucson, Ariz.

Alco Locomotive Order

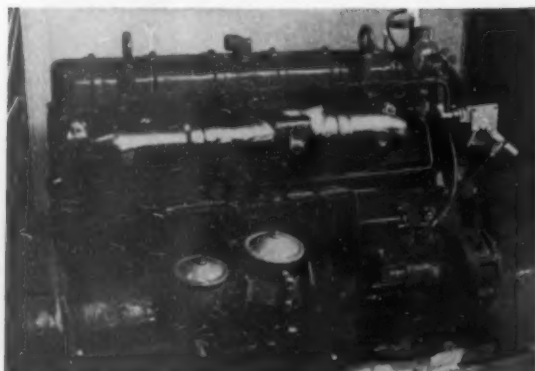
Alco Products, Inc. announced receipt of a \$1.8 million order from the Seaboard Air Line Railroad for 10 diesel-electric locomotives. The builder said the order was for its 1800 hp DL-701 road switcher locomotives, powered by Alco's turbo-supercharged, 12-cylinder model 251 diesel engine.

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AMOT MODEL 2800 Safety Trip



Provides AMOT protection to smaller engines and industrial equipment



Model 2800 SAFETY TRIP with 2230 Temperature Valve installed on a Waukesha Diesel Engine, Model DK8, being crated for shipment.

HOW IT WORKS—The SAFETY TRIP is a snap acting mechanical control which trips on low oil pressure and closes a fuel or air valve to shut down the engine or return it to idle.

HOW IT'S MADE—The Model 2800 housing is a high strength aluminum alloy die casting, while the working parts are of precision cast steel. No stampings to bend or break. A manual stop button is standard on all controls.

FOR MORE INFORMATION ON THE MODEL 2800 write to

AMOT CONTROLS CORPORATION

FIRST STREET & NEVIN AVENUE

RICHMOND, CALIFORNIA

Representatives in Principal U.S. Cities

Michigan-Ohio News

By Jim Brown

A Hough model 120 Payloader was recently sold to the L. W. Edison Co. of Grand Rapids, Michigan. The new Hough has a 5-yd. bucket, 4-wheel drive on 29 1/2" tires, and is powered by a 300 hp Cummins NRT-6-BI (turbocharged) diesel engine. It is now being used to level a 700,000 cu. yd. hill of sand, at the rate of over 3,000 yds. a day, loading trucks. Sale was made by the Grand Rapids branch of Wolverine Tractor & Equipment Co.

EARLE Equipment Co. of Detroit has sold a model HD6 Allis-Chalmers tractor to Pierson Contracting Co. of Jackson, Michigan.

TROELSON Construction Co. of Detroit has accepted delivery on a Northwest model 25D pullshovel with a 3/4-yd.

bucket and Murphy diesel engine. Sale was made by Cyril J. Burke Inc. of Detroit.

A model 204 Trojan loader with a 2 yd. bucket and GM model 3-71 diesel engine was recently delivered to Fattore Co. of Centerline, Mich. The new loader will be broken in on a sewer project in Livonia, Mich., and was sold by R. G. Moeller Co. of Detroit.

PENINSULAR Diesel Inc. of Detroit has installed a GM model 7067-7240 diesel engine in a Reo 730 truck, converting it from gasoline to diesel. The installation was done for Laurence Boettcher of Detroit.

THE Midland County Road Commission has accepted delivery on a Hough model H-70 Payloader powered by a Cummins JN-6-BI engine. Sold by Wolverine Tractor & Equipment Co. of Detroit and Grand Rapids.

A new Allis-Chalmers model HD6E tractor has been sold to Jim Coe of Pontiac, Michigan. Sale was by Earle Equipment Co.

NORTHEAST Construction Co. of East Detroit, Mich. has accepted delivery on a 3 1/2-yd. Northwest model 95 pullshovel powered by a Murphy diesel engine. The new Northwest will be broken in on a sewer job in Detroit, and was purchased from Cyril J. Burke, Inc.

PENINSULAR Diesel Inc. has installed a GM model 3055C diesel engine in a General model 307 crane (3/4-yd.). The installation was made for E. G. McDermott of Grand Rapids, Mich.

LIVINGSTON County Road Commission has accepted delivery on an Austin-Western Super 300 grader powered by a GM model 4-71 diesel engine. Sale was by R. G. Moeller Co.

A Galion model 118 motor grader powered by a GM diesel engine was recently delivered to Lapeer County Road Commission in Michigan. Sale was made by Wolverine Tractor & Equipment Co.

A model 250D Pettibone loader with a 3 1/2 yd. bucket and powered by a GM model 4-71 diesel engine was recently delivered by Chester Jakubiak for use in his gravel pit in Mt. Clemens, Michigan. Sale was made by Cyril J. Burke Inc.

GREAT Lakes Steel Corp. of Ecorse, Mich. has accepted delivery on an Allis-Chalmers model TL12D front end loader. The new Tracto-loader has 4-wheel drive and a 1 1/2 yd. bucket capacity. Sale was made by Earle Equipment Co.

THE J. R. Panelli Equipment Co. of Detroit has sold a Case model 1000 "tilt crown" dozer. The new dozer is powered by a Continental diesel engine and weighs 16,450 lbs. with hydraulic dozer blade attachment. The unit was sold by Fenton & Raymond of Memphis, Mich.

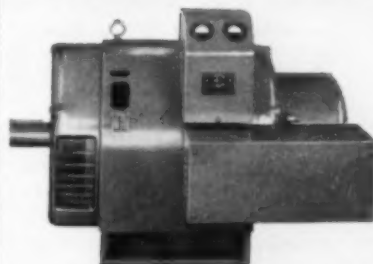
R. L. COOLSAET Construction Co. of Dearborn, Mich. has accepted delivery on a new International model TD-9 equipped with a bullgrader blade. The sale was made by Wolverine Tractor & Equipment Co.

CUMMINS Diesel Michigan Inc. of Dearborn, Mich. reports sale of a Cummins NH-195 for installation in a 920 Diamond T truck. The installation will be made by James House & Sons of Essexville, Mich., who will use the Diamond T for an oil haul.

WENDELL Stockton of Dearborn, Michigan has accepted delivery on a Northwest model 25D (3/4 yd.) pullshovel.

READY NOW! The completely new 1960 edition of the **DIESEL AND GAS ENGINE CATALOG**, Volume 25, can now be purchased. If you design, purchase, sell, operate or service diesel, dual fuel, or gas engines, the Catalog is essential to you and your business. This giant, 442 page, 10 1/2 x 13 1/2", fully illustrated reference book has been rewritten, revised and brought up to date completely from cover to cover and costs just \$10 postpaid anywhere in the world. Send checks, money orders or company orders to **DIESEL AND GAS ENGINE CATALOG**, 9110 Sunset Blvd., Los Angeles 46, Calif.

Get the latest! A COMPLETELY NEW "PACKAGED" GENERATOR AMP-PAK



AMP-PAK Generator shown is rated at 187 kva, 1200 rpm, 240/480 volts. AMP-PAK is available in ratings of 75 thru 187 kva at 1800 rpm and 62 1/2 thru 187 kva at 1200 rpm. Three phase, 80% PF, 60 cycles, 50C rise, and 120/208, 240 and 480 volts.

No exciter... No moving parts in the voltage regulator

AMP-PAK is a compact, revolving field a-c generator with built-in, static excitation system; static voltage regulator; and basic metering and controls conveniently grouped. AMP-PAK is a portable unit, factory assembled, internally connected, and tested.

No rotating exciter to maintain. D-C excitation is provided by a heavy duty, long-life, static rectifier.

No tubes, relays, vibrators to service. Voltage is regulated by a static, E-M-developed sensing circuit and "magical" magnetic amplifiers.

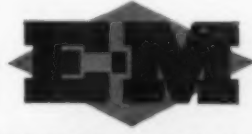
Holds voltage "rock-steady" so your motors, lights, and electronic equipment will work better. The static regulator provides $\pm 2\%$ regulation.

Starts big motors. A special, built-in voltage booster transformer stands by to reinforce line voltage when heavy loads are suddenly applied.

Easy to install. Needs no switchboard. Just connect load to AMP-PAK thru a suitable line switch.

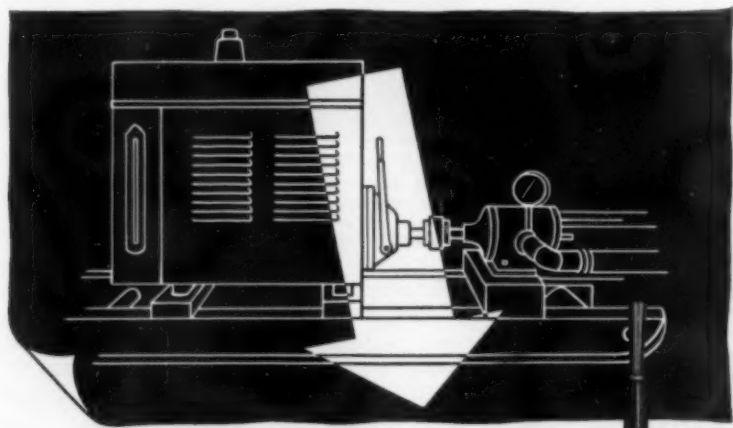
Simple to operate. Has no belts, no "tricky" commutator, no adjustments—anyone can operate AMP-PAK.

See your nearest E-M Sales Engineer and write the factory for publication PRD-236.



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Year after year... Rockford PTO's work smoothly, efficiently, and without maintenance in the Oil Fields. Now they are being specified by more and more oil men as a dependable component of new equipment. Next time, specify a Rockford Power Take Off and rely on the fact, you've selected the best—write for information and specifications.



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Bradley Heads IH Division



Robert B. Bradley

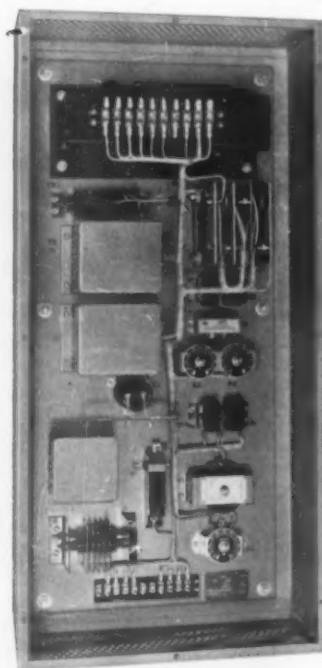
Robert B. Bradley has been elected vice-president and executive head of International Harvester Company's Construction Equipment Division, by action of the board of directors. Mr. Bradley, president of International Harvester Company of Canada, Ltd., succeeds Harald T. Reishus, retired. He joined the company in 1929 and was elected top executive of the Canadian company in 1954. When Harvester formed its Construction Equipment Division in 1944, Mr. Reishus was appointed general manager and executive head. He was elected vice-president in 1953. Headquarters of the Construction Equipment Division are at Harvester's Melrose Park, (Ill.) Works.

Huge Shipyard Crane

The largest crane ever built in Canada—as tall as a 20-story building and weighing 325 tons—is at work at Port Weller, Ont., to aid Great Lakes shipping on the St. Lawrence Seaway. The huge machine's boom stretches 225 ft. in the air, so high it carries aircraft warning lights. The crane was designed, built and erected by Provincial Engineering, Ltd., of Niagara Falls, a subsidiary of Houdaille Industries, of Buffalo. Port Weller Dry Docks Ltd., owners of the new level luffing gantry



crane, built a heavy duty railway track extending 2,000 ft. from their building berth to the fitting-out berth to take maximum advantage of the mechanical giant. The crane moves along the track on 16 wheels, each 27 ins. in diameter. Equipped with its own diesel electric power plant, the crane's 140-foot boom can lift a maximum of 55 tons. An auxiliary 12-foot jib hoist attached to the main boom has a lifting capacity of five tons. Power for crane operation is supplied by a diesel generator set consisting of a National type NMS-6 diesel engine driving a Tamper Ltd., 192 kw generator and 240 kva exciter. The National turbocharged 6-cylinder engine with 8.5x6 in. bore and stroke is rated 288 cont. hp at 1200 rpm. Principal motors on the crane total 365 hp.



F-33 Voltage Regulator provides $\pm 2\%$ regulation ... is completely static

The new Fincor F-33 Voltage Regulator is a completely static, magnetic amplifier controlled device which provides regulation of generator output to as low as $\pm 1\%$. It is compact, lightweight ... has no tubes to fail ... requires no warm-up time ... is ruggedly constructed for long, trouble-free service under conditions of high shock and vibration. Response time of the regulator alone can be as short as three cycles. The Fincor F-33 is designed for use on 60 cycle generators requiring a dc field supply up to 25 amps at 125 volts or less. If desired, field forcing can be provided with a current transformer. For complete information, write for Bulletin 3300.

NET COST \$678.00

Other Fincor Voltage Regulators are available for use with generators needing up to 5 kw field power.

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F-33/60

19 Florida Trawlers for Pacific

Diesel Engine Sales of St. Augustine, Fla., is building 19 Florida type shrimp trawlers for various shrimp producing firms in San Salvador, C.A. L. C. Ringhaver, president of Diesel Engine Sales said that the 19 trawlers will be among 50 for which the El Salvador government has granted permits to fish along the Pacific coast of Central America and out of ports of that country. All 19 vessels are powered by Caterpillar marine diesel engines. The vessels are equipped with brine tanks to keep the shrimp fresh at a low temperature until they can be landed, frozen and shipped via air to Tampa for distribution to northern fish markets. The vessels are of the standard 62 and 68 ft. DESCO production line of trawler. Engine room specifications call for each to have a model D342 Caterpillar diesel engine having a 170 hp rating, Twin Disc 3:1 r&r gears for a speed of ten knots and a Petter Pazi 1.5 kw diesel auxiliary

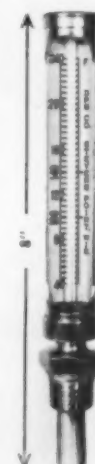


Five of the Florida type shrimp trawlers built by Diesel Engine Sales of St. Augustine for Compania de Inversiones, S. A. All are 62x18 ft. in size, have D 342 Caterpillar 170 hp diesel engines for propulsion and a 1.5 kw Petter diesel generating set in the engine room.

light plant. A model R 5002 Brunner compressor running off the front power take-off circulates the freon gas used as a coolant through the refrigeration system.

New Boeing Turbo-Starter

Providing electrical and pneumatic ground support to a Boeing 720 jetliner is a new model Turbo-starter developed jointly by the Boeing Industrial Products Division and General Electric Co. This unit is an adaptation of the Boeing Turbo-Starter which is providing pneumatic support for jetliners around the world. Addition of a 60 kva alternator to the Boeing Turbo-Starter gives airlines two ground support jobs in a single package.



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FEATURES All brass construction, nickel finish, cork insulation.

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40 years continuously in the diesel engine business.

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Garrett, Robert Bosch In Licensing Agreement



The Garrett Corp., Los Angeles, has completed a joint licensing agreement with Robert Bosch, GmbH, manufacturer of diesel and automotive products of Stuttgart, Germany to produce and sell Garrett diesel turbochargers and related control systems. Under terms of the agreement, negotiated by Garrett International, S.A., of Geneva, Switzerland, a subsidiary of The Garrett Corporation, Bosch may establish production manufacturing facilities for the turbochargers and control systems in the Federal Republic of Germany, and the Republic of France, including Algeria and French African Territories. Bosch's sales area covers the free world countries other than the U.S., Canada, United Kingdom and Eire. In England, Rotol, Ltd., of Gloucester, has been a Garrett licensee for its turbochargers over the past two years. Dr. Hans Heinrich (center of photo, with pencil), representing Robert Bosch, reviewed turbocharger performance data during a visit to Garrett's AiResearch Industrial Division in Los Angeles. Others shown in conference with Dr. Heinrich are, l. to r., Wilton Parker, AiResearch manager; Hans Egli, AiResearch chief engineer; Dr. W. T. von der Nuell, chairman of Garrett corporate research board; Roger Schwartz, Garrett European representative, and Robert Fiege, Garrett assistant to the vice-president for international operations and support services.

Attend Distributor Sales Meeting

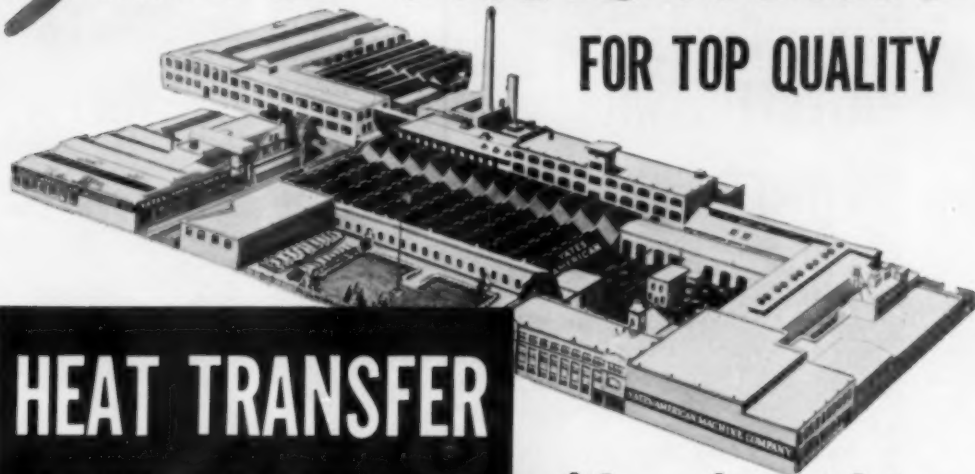


Distributors and officials of the Robert Bosch Corp., in the U. S., recently flew to the headquarters of the company in Stuttgart, Germany, to attend a series of technical and sales meetings coupled with plant inspections. The group is shown prior to their departure from New York.

READY NOW! The completely new 1960 edition of the **DIESEL AND GAS ENGINE CATALOG**, Volume 25, can now be purchased. If you design, purchase, sell, operate or service diesel, dual fuel, or gas engines, the Catalog is essential to you and your business. This giant, 442 page, 10½ x 13½", fully illustrated reference book has been rewritten, revised and brought up to date completely from cover to cover. Send your order in now for this limited edition, which costs just \$10 postpaid anywhere in the world. Send checks, money orders or company orders to **DIESEL AND GAS ENGINE CATALOG**, 9110 Sunset Blvd., Los Angeles 46, Calif.

AUGUST 1960

Yates-American FOR TOP QUALITY

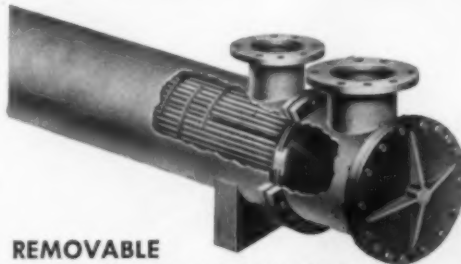


HEAT TRANSFER EQUIPMENT ...

with a size and type
for every purpose

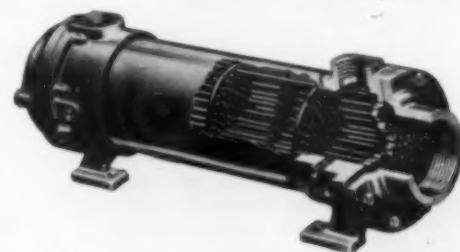
Today's broad line of Y-A liquid heating and cooling units is the result of over 25 years of engineering experience and manufacturing skills serving the diversified needs of industry and the military services.

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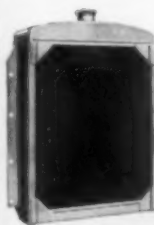
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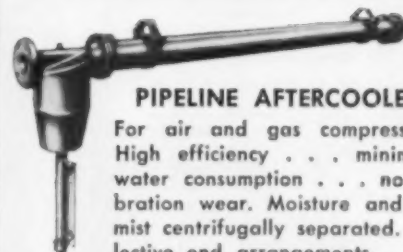
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ADVERTISERS' INDEX

Allis-Chalmers	9	General Motors Corp.	
Amot Controls Corp.	68	Delco-Remy Division	62-63
Bosch Corporation, Robert	17	Electro-Motive Division	18-19
Briggs Filtration Co., The	60	Harrison Radiator Division	2
Caterpillar Tractor Co.		Gillett & Eaton, Inc.	15
Engine Division	1	Hanlon & Wilson Co.	5
C.A.V. Ltd.	53	Harrison Radiator Division General Motors Corp.	2
Chrysler Corporation		Hilliard Corporation, The	55
Industrial Engine Division	58-59	Kittell Muffler & Engineering Co.	60
Cities Service Oil Co.	16	Luber-Finer, Inc.	65
Cooper-Bessemer Corp.	Fourth Cover	Minneapolis-Honeywell Regulator Co.	12
Cotta Transmission Co.	66	Perfect Circle Corporation	56
Cummins Engine Co., Inc.	6-7	Robertshaw-Fulton Controls Co. Fulton Sylphon Division	61
Delco-Remy Division		Rockford Clutch Division Borg-Warner	69
General Motors Corp.	62-63	Shell Oil Company	4
Diesel and Gas Engine Catalog	13	Standard Oil Co. of California	11
Diesel Plant Specialties Co.	70	Texaco, Inc.	Second Cover
Donaldson Company, Inc.	8	Thomas Flexible Coupling Co.	72
Electric Machinery Mfg. Co.	69	Thompson-Ramo-Wooldridge, Inc. Valve Division	10
Electro-Motive Division		Twin Disc Clutch Co.	20
General Motors Corp.	18-19	Waukesha Motor Company	64
Elliott Company	67	White Diesel Engine Division The White Motor Company	15
Engineering Controls, Inc.	54	Wichita Clutch Company, Inc.	Third Cover
Fidelity Instrument Corp.	70	Winslow Engineering & Manufacturing Co.	57
Fulton Sylphon Division		Yates-American Machine Co.	71
Robertshaw-Fulton Controls Co.	61		

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Don Bramley, left, Sales Engineer, The Cooper-Bessemer Corporation, and James Rawlings, Superintendent of generating plant, Augusta, Kansas report...

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